

766
SEAMAN'S ASSISTANT;

533.0/4
118
SHEWING

HOW TO CORRECT THE LATITUDE COMPUTED FROM
DEAD RECKONINGS,

AND TO ASCERTAIN THE TIME OF THE DAY,
AND THE VARIATIONS OF THE COMPASS,

BY A SINGLE ALTITUDE.

BY JOHN SYEDS,

PATENTEE OF THE IMPROVED QUADRANT WITH AN ARTIFICIAL HORIZON.

LONDON:

PRINTED FOR THE AUTHOR, AND SOLD BY HIM AT NO. 25, PARKER'S-ROW,
NEW-ROAD, DOCK-HEAD, SOUTHWARK,

OF WHOM MAY ALSO BE HAD,

THE STEERING COMPASS, WITH THE USUAL ERRORS REMOVED,

[ENTERED AT STATIONERS HALL.]

ERRATA.

Page	Deg.	Min.	No. I.	No. II.	No. III.	No. IV.
			<i>read</i>	<i>read</i>	<i>read</i>	<i>Instead of</i>
31	2	0	—	—	8542819	8442819
		1	—	—	8546422	8446422
		2	—	—	8549995	8449995
		3	—	—	8553539	8453539
		4	—	—	8557954	8457954
		5	—	—	8560540	8460540
		6	—	—	8563999	8463999
		7	—	—	8567431	8467431
		8	—	—	8570836	8470836
		9	—	—	8574214	8474214
		10	—	—	8577566	8477566
		11	—	—	8580892	8480892
		12	—	—	8584193	8484193
		13	—	—	8587469	8487469
		14	—	—	8590721	8490721
		15	—	—	8593948	8493948
		16	—	—	8597152	8497152
32	4	35	—	—	8902596	8912596
	5	55	2320	—	—	2920
	7	32	3765	—	—	5765
36	22	25	34124	—	—	34 24
38	28	27	—	—	9677964	3677964
40	36	42	95947	—	—	96947
		53	96986	—	—	97986
	38	41	—	—	9795891	9796891
43	49	58	—	—	9884042	9883042
48	70	59	—	—	9975626	9976625
54	88	15	1515152	—	—	1505152
		16	1519307	—	—	1509307
		52	1703793	—	—	1693793
		56	1730119	—	—	1720119
		57	1736958	—	—	1726958
	89	1	1765443	—	—	1795443
		27	—	12995	—	12965
		40	—	21198	—	21189
		56	—	96910	—	106910

ALSO.

- Page 55, l. 4, from bottom, for *latitude* read *altitude*.
- 56, l. 4, from bottom, for *latitude* read *altitude*.
- ibid. l. 10, for *same table* read *Time Table*.
- 61, l. 17, for No. IV. read No. III.
- 62, l. 4, for ditto read ditto.
- 63, l. 4, for ditto read ditto.

TO THE
OFFICERS OF THE ROYAL NAVY,

THE
HONOURABLE EAST-INDIA COMPANY,
AND NAVIGATORS IN GENERAL.

GENTLEMEN,

HAVING spent the greater part of my life-time at sea, I have learned by experience, not only the disadvantages but the dangers of being unacquainted with the true latitude, especially when approaching the shore; and it often happens that the sun is so overcast at noon, that there is no possibility of obtaining the meridian altitude. I have therefore composed the following tables for regulating time, and correcting the latitude, computed from dead reckonings, by a single altitude, at any time in the forenoon, when the sun is not less than three points from the East; or at any time in the afternoon, when the sun is not less than three points from the West. I have arranged the amplitudes and time of day for North and South declinations, from the equator to 66 degrees 32 minutes; I have formed a table for ascertaining the variation of the compass, and regulating time when the sun is above the horizon at midnight; and I have added a few instructions, which, I trust, will be of use.

At a very heavy expence, but with the certain prospect of serving my country, I have made this attempt to improve navigation; and should my laborious exertions in compiling the following tables, meet with your patronage and encouragement, I shall lose no time in systematising further useful ideas on this subject.

I am,

GENTLEMEN, with perfect respect,

Your most obedient, and most humble servant,

JOHN SYEDS.

SUBSCRIBERS TO THIS WORK.

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JOHN LE BRITTON.

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1801, 1805, 1809, 1813, 1817, 1821, 1825, 1829,
1833, 1837, 1841, 1845.

Sun's declination for the 2d year after leap year, 1798, 1802,
1806, 1810, 1814, 1818, 1822, 1826, 1830, 1834,
1838, 1842, 1846.

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
S.	S.	S.	N.	N.	N.	N.	N.	N.	S.	S.	S.
1 22 57 16 52	1 22 57 16 52	7 17 4 50 15	4 50 15	8 22 10 23	5 17 53	8 3	3 28 14	4 1 21 57	3 28 14	4 1 21 57	3 28 14
2 22 52 16 35	2 22 52 16 35	6 54 5 13 15	5 13 15	36 22 17 23	1 17 37	7 41	3 51 15	0 22 6	3 51 15	0 22 6	3 51 15
3 22 45 16 17	3 22 45 16 17	6 31 5 36 15	5 36 15	22 25 22 56 17	21 5	7 19	4 14 15	19 22 14	4 14 15	19 22 14	4 14 15
4 23 39 15 59	4 23 39 15 59	6 8 5 59 16	5 59 16	11 22 32 22 51 17	5 17 5	6 57	4 38 15	37 22 22	4 38 15	37 22 22	4 38 15
5 22 32 15 41	5 22 32 15 41	5 45 6 21 16	6 21 16	28 22 38 22 45 16	49 33	6 34	5 1 15	56 22 30	5 1 15	56 22 30	5 1 15
6 22 25 15 22	6 22 25 15 22	5 22 6 44 16	6 44 16	44 22 44 22 39 16	33 16	6 12	5 24 16	14 22 37	5 24 16	14 22 37	5 24 16
7 22 17 15 3	7 22 17 15 3	4 58 7 7 17	7 7 17	1 22 50 22 32 16	15 59	5 49	5 47 16	31 22 43	5 47 16	31 22 43	5 47 16
8 22 9 14 44	8 22 9 14 44	4 35 7 29 17	7 29 17	17 23 55 22 26 15	59 41	5 27	6 10 16	49 22 49	6 10 16	49 22 49	6 10 16
9 22 0 14 25	9 22 0 14 25	4 11 7 51 17	7 51 17	33 23 0 22 18 15	41 24	5 4	6 33 17	16 22 55	6 33 17	16 22 55	6 33 17
10 21 51 14 5	10 21 51 14 5	3 48 8 13 17	8 13 17	49 23 5 22 11 15	24 6	4 41	6 55 17	23 23 0	6 55 17	23 23 0	6 55 17
11 21 41 13 43	11 21 41 13 43	3 24 8 35 18	8 35 18	4 23 9 22 3 15	6 48	4 18	7 18 17	39 23 5	7 18 17	39 23 5	7 18 17
12 21 31 13 25	12 21 31 13 25	3 1 8 57 18	8 57 18	19 23 13 21 54 14	48 29	3 55	7 41 17	55 23 10	7 41 17	55 23 10	7 41 17
13 21 21 13 5	13 21 21 13 5	2 37 9 19 18	9 19 18	34 23 16 21 46 14	29 11	3 32	8 3 18	11 23 13	8 3 18	11 23 13	8 3 18
14 21 10 12 45	14 21 10 12 45	2 13 9 40 18	9 40 18	48 23 19 21 36 14	11 52	3 9	8 25 18	27 23 17	8 25 18	27 23 17	8 25 18
15 20 59 12 24	15 20 59 12 24	1 50 10 2 19	2 19 23	21 21 27 13 33	33 14	2 46	8 48 18	42 23 20	8 48 18	42 23 20	8 48 18
16 20 47 12 3	16 20 47 12 3	1 26 10 23 19	23 19	16 23 24 21 17 13	33 14	2 23	9 10 18	57 23 22	9 10 18	57 23 22	9 10 18
17 20 35 11 42	17 20 35 11 42	1 2 10 44 19	44 19	30 23 25 21 7 13	14 35	2 0	9 32 19	12 23 24	9 32 19	12 23 24	9 32 19
18 20 23 11 21	18 20 23 11 21	0 39 11 5 19	5 19 43	23 26 20 56 12 54	12 35	1 36	9 54 19	26 23 26	9 54 19	26 23 26	9 54 19
19 20 10 10 59	19 20 10 10 59	0 15 11 26 19	26 19	56 23 27 20 45 12 35	12 35	1 13	10 15 19	40 23 27	10 15 19	40 23 27	10 15 19
20 19 52 10 38	20 19 52 10 38	0 9 11 46 20	46 20	8 23 28 20 34 12 15	15 55	0 50	10 37 19	53 23 28	10 37 19	53 23 28	10 37 19
21 19 44 10 16	21 19 44 10 16	0 32 12 6 20	6 20	20 23 28 20 22 11 55	55 34	0 26	10 58 20	6 23 28	10 58 20	6 23 28	10 58 20
22 19 30 9 51	22 19 30 9 51	0 56 12 27 20	27 20	32 23 27 20 10 11 34	34 14	0 3	11 19 20	19 23 27	11 19 20	19 23 27	11 19 20
23 19 15 9 32	23 19 15 9 32	1 20 12 47 20	47 20	43 23 27 19 58 11 14	14 53	0 52	11 40 20	32 23 27	11 40 20	32 23 27	11 40 20
24 19 1 9 10	24 19 1 9 10	1 43 13 6 20	6 20	54 23 25 19 45 10 53	53 33	0 44	12 1 20	44 23 25	12 1 20	44 23 25	12 1 20
25 18 46 8 48	25 18 46 8 48	2 7 13 26 21	26 21	5 23 24 19 32 10 33	33 12	1 7	12 22 20	55 23 24	12 22 20	55 23 24	12 22 20
26 18 31 8 25	26 18 31 8 25	2 30 13 45 21	45 21	15 23 22 19 19 10 12	12 51	1 31	12 43 21	7 23 21	12 43 21	7 23 21	12 43 21
27 18 15 8 3	27 18 15 8 3	2 54 14 42 21	42 21	25 23 19 19 5 9 51	51 29	1 54	13 3 21	17 23 19	13 3 21	17 23 19	13 3 21
28 17 59 7 40	28 17 59 7 40	3 17 14 23 21	23 21	35 23 16 18 51 9 29	29 8	2 18	13 23 21	28 23 16	2 18 13	23 21 28	2 18 13
29 17 43	29 17 43	3 40 14 41 21	41 21	44 23 13 18 37 9 8	8 47	2 41	13 43 21	38 23 12	2 41 13	43 21 38	2 41 13
30 17 26	30 17 26	4 4 15	0 21 53	23 9 18 23 8 25	25 8	3 4	14 2 21	48 23 8	4 14 2	2 48 21	3 4 14
31 17 9	31 17 9	4 27	22	18 8 25	25 8	4 14	14 22	23 3	4 14 22	23 3	4 14 22

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
S.	S.	S.	N.	N.	N.	N.	N.	N.	N.	S.	S.	S.	S.	S.	S.	N.	N.	N.	N.	N.	N.	N.	N.	N.	
123	017	729	438	922	623	818	0	814	316	1432	2152	123	117	712	455	222	1123	517	749	758	333	1445	2155	23	
222	5516	447	515	2722	1423	317	45	752	339	1451	2201	222	5616	49	518	3922	1923	017	734	736	356	1542	4228	7	
322	4916	266	524	4422	2122	5917	30	730	4315	1022	10	322	5016	31	626	5415	5722	2622	5517	714	420	1523	2216	1	
422	4316	086	547	222	2822	5417	14	8	42615	2822	18	422	4416	13	63	6416	1422	3322	5017	02	652	44715	4222	24	
522	3615	505	610	1922	3522	4816	58	46	44915	4622	26	522	3815	55	540	62616	3122	4022	4416	46	629	5616	02231	1	
622	2915	325	633	3622	4122	4216	41	24	51216	5222	40	622	3115	37	517	64916	4822	4622	3816	29	67	64916	182238	18	
722	2115	135	655	5222	4722	3616	24	1	53516	4022	46	722	2315	18	453	71117	4222	5722	3116	12	544	55216	352245	45	
822	1314	544	718	922	5322	2916	7	38	55816	5722	52	822	1514	59	430	73417	2123	3722	2415	55	522	61516	532257	56	
922	514	354	740	2522	5822	2215	50	16	62116	5722	58	922	714	40	67	75617	3723	122	1715	37	458	63817	102256	2	
1021	5614	154	821	4123	322	1515	33	453	64417	1422	58	1021	5814	21	343	81817	5223	622	915	20	436	7017	26232	6	
1121	4613	563	824	5623	722	0715	15	30	717	3123	3	1121	4914	1	319	84018	723	1022	115	2	413	72317	4323	3	
1221	3713	363	846	1123	1121	5914	57	7	72917	4723	8	1221	3913	41	256	9218	2223	1421	5314	44	350	74617	592311	11	
1321	2613	162	818	2623	1421	5014	39	44	75218	323	12	1321	2913	21	232	92418	3723	1721	4414	25	327	81818	152314	14	
1421	1612	552	930	4123	1821	4114	20	21	81418	1923	15	1421	1913	1	28	94518	5123	2021	3414	7	48	83018	302318	18	
1521	512	352	951	5523	2021	3214	2	58	83618	3423	19	1521	812	40	145	10619	523	2221	2513	48	241	85318	452321	21	
1620	5312	141	138	1219	923	2321	43	35	85818	4923	21	1620	5712	20	121	2819	1923	2421	1513	29	218	91519	02323	28	
1720	4211	531	115	1033	1923	2521	24	12	92119	423	24	1720	4511	59	057	104919	3323	2621	513	10	155	93719	152325	25	
1820	3011	320	051	1054	1936	2621	4	48	94219	1923	25	1820	3311	38	034	11919	4623	2720	5412	50	131	95819	292326	26	
1920	1711	110	027	1115	1949	2327	45	25	1	419	3323	27	1920	2011	16	1010	3019	5823	2820	4312	30	18	102019	432327	27
2020	410	490	N411	3620	223	2820	4012	25	1210	2619	4623	28	2020	810	550	N1411	5120	1123	2820	3212	10	045	104219	562328	28
2119	5110	270	020	1156	1423	2820	2812	5	038	104720	023	28	2119	5410	330	037	1211	2323	2720	811	50	02111	320	923	28
2219	3710	60	044	1216	2623	2820	1711	45	015	11920	1323	28	2219	4110	111	13112	3120	3423	2720	811	30	00211	2420	2223	27
2319	239	441	1712	3620	3723	2720	411	25	089	113020	2523	27	2319	139	501	12512	5120	4623	2719	5511	10	02611	4520	3423	27
2419	090	221	13112	5620	4923	2619	5211	4	032	115120	3823	26	2419	173	279	4813	1020	5723	2519	4310	49	04912	620	4623	25
2518	548	599	15513	1621	023	2519	3910	43	056	121221	5023	25	2518	589	525	21213	3021	723	2319	3010	28	11312	2720	5823	23
2618	398	377	21813	3521	1023	2319	2610	23	119	123221	123	23	2618	438	432	3513	4921	2823	2119	1610	7	13612	4721	0923	21
2718	238	144	24213	5421	2023	2119	1310	2	142	125321	1223	20	2718	1228	208	25914	821	2323	1919	3	946	15913	721	2023	18
2818	87	527	30514	1321	3923	1818	599	40	613	1321	2323	17	2818	127	5820	32214	2721	3723	1618	49	925	22313	2721	3023	15
2917	525	143	2814	3221	4023	1518	459	19	229	133321	3323	14	2917	567	358	4514	4521	4623	1218	34	93	24613	4721	4023	11
3017	353	5214	5021	4923	1518	309	582	2	5313	5321	4323	10	3017	407	357	0915	421	5523	918	20	842	1014	721	5023	7
3117	184	1515	415	2147	1816	836	2	14	12	12	236	3117	2323	6	432	2203	185	1420	232	2	1420	232	2	2	

A Description of the TABLES of the SUN's Declination.

THE Four Tables begin at the first year after leap-year, and end at leap-year.

At the head of each Table are the years corresponding, according to the caricature of the first, second, and third years after leap-year, and also when leap-year.

The left hand column of each Table expresses the day of the month, at the top is the name of the month; under which, against the day of the month, is the declination at noon at London, for which place and time it is calculated.

To find the declination in any year at noon, in the meridian of London see the following examples :

Look for the year and month at the top of the Table, and against the day of the month, under the month, is the Sun's declination required.

Example 1. On the 2d of January, 1793, what is the declination at noon in the meridian of London?

The year 1793, is the first year after leap year, against the 2d day of the month, and under January, is 22 deg. 22 min. the declination South.

Example 2. On the 2d of April, 1793, what is the declination at noon, in the meridian of London?

Against the 2d day of the month, and under April, is 5 deg. 13 min. the declination North.

Example 3. On the 2d of January, 1794, what is the declination at noon, in the meridian of London?

The year 1794, is the second year after leap year, under which, and against the 3d day of the month, is 22 deg. 54 min. the declination South.

Example 4. On the 2d of April, 1794, what is the declination at noon, in the meridian of London?

Against the 2d day of the month, and under April, is 5 deg. 4 min. the declination North.

The variation of the Sun's declination at noon from the meridian of London to every 15 degrees longitude East or West.

Daily differ.	15		30		45		60		75		90		105		120		135		150		175		180	
	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.M.	M.	S.
1	0	2	0	5	0	7	0	10	0	12	0	15	0	17	0	20	0	22	0	25	0	27	0	30
2	0	5	0	10	0	15	0	20	0	25	0	30	0	35	0	40	0	45	0	50	0	55	0	0
3	0	7	0	15	0	22	0	30	0	37	0	45	0	52	0	0	1	7	1	15	1	22	1	30
4	0	10	0	20	0	30	0	40	0	51	0	0	1	10	1	20	1	30	1	40	1	50	1	0
5	0	12	0	25	0	37	0	50	0	3	1	15	1	28	1	40	1	52	1	5	2	17	2	30
6	0	15	0	30	0	45	0	0	1	15	1	30	1	45	2	0	2	37	2	30	3	45	3	0
7	0	17	0	35	0	52	1	10	1	27	1	45	2	20	2	40	3	37	3	45	4	55	4	30
8	0	20	0	40	0	0	1	20	1	40	2	0	2	20	3	0	3	0	3	20	4	7	4	0
9	0	22	0	45	0	7	1	30	1	52	2	15	3	37	3	40	4	22	4	45	5	40	5	30
10	0	25	0	50	0	15	1	40	2	5	2	30	4	55	3	20	5	45	5	50	6	55	6	0
11	0	27	0	55	0	22	1	50	2	17	2	40	5	12	4	40	6	52	6	5	7	0	7	30
12	0	30	0	0	1	30	2	0	2	30	3	0	3	30	4	0	7	30	7	10	8	10	8	0
13	0	32	0	5	1	37	2	10	2	42	3	15	3	47	4	40	8	37	8	25	15	30	9	30
14	0	35	0	10	1	45	2	20	2	57	3	30	4	5	5	50	9	45	9	30	25	37	10	0
15	0	37	0	15	1	52	2	30	3	7	3	45	4	25	6	0	10	52	10	40	32	47	11	30
16	0	40	0	20	1	0	2	40	3	20	4	0	4	40	6	40	11	0	11	45	52	0	0	0
17	0	42	0	25	2	7	2	50	3	32	4	15	5	57	6	50	12	7	12	50	0	8	30	0
18	0	45	0	30	2	15	3	0	3	45	4	30	6	5	6	0	13	45	13	55	15	9	0	0
19	0	47	0	35	2	22	3	10	3	57	4	45	6	15	7	40	14	7	14	0	10	9	30	0
20	0	50	0	40	2	30	3	20	4	10	5	50	7	32	6	50	15	7	15	5	10	10	0	0
21	0	52	0	45	2	37	3	30	4	22	5	55	8	7	7	0	16	8	16	10	37	10	30	0
22	0	55	0	50	2	45	3	40	4	35	5	0	9	25	8	20	17	8	17	10	51	11	0	0
23	0	57	0	55	2	52	3	50	4	47	5	5	10	42	9	40	18	9	18	35	32	11	30	0
24	1	0	2	0	3	0	4	0	5	0	6	7	0	0	8	9	0	10	11	0	0	12	0	0

T H E

Hourly Variation of the SUN's declination in the meridian of London.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.
1	0 2	0 5	0 7	0 10	0 12	0 15	0 17	0 20	0 22	0 25	0 27	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0
2	0 5	0 10	0 15	0 20	0 25	0 30	0 35	0 40	0 45	0 50	0 55	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0
3	0 7	0 15	0 22	0 30	0 35	0 45	0 52	1 0	1 7	1 15	1 22	1 30	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0
4	0 10	0 20	0 30	0 40	0 50	1 0	1 10	1 20	1 30	1 40	1 50	2 0	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0
5	0 12	0 25	0 37	0 50	1 4	1 15	1 27	1 45	2 2	2 15	2 45	3 0	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0
6	0 15	0 30	0 45	1 0	1 15	1 30	1 45	2 0	2 20	2 35	3 12	4 0	4 20	4 40	5 0	5 20	5 40	6 0	6 20	6 40	7 0	7 20	7 40	8 0
7	0 17	0 35	0 52	1 10	1 20	1 45	2 2	2 20	3 0	3 25	4 10	4 35	5 25	5 50	6 30	7 0	7 47	8 15	8 43	9 10	9 38	10 5	10 33	11 0
8	0 20	0 40	1 0	1 20	1 40	2 0	2 37	3 0	3 22	4 7	4 35	5 2	5 30	6 25	7 0	7 30	8 0	8 45	9 10	9 30	10 10	10 30	11 0	11 30
9	0 22	0 45	1 1	1 30	1 52	2 5	3 22	3 45	4 10	4 35	5 2	5 30	6 30	7 2	7 35	8 7	8 40	9 12	9 45	10 18	10 43	11 10	11 38	12 0
10	0 25	0 50	1 15	1 40	2 15	2 30	3 45	4 10	4 35	5 25	6 10	6 30	7 2	7 45	8 10	8 40	9 20	10 30	11 15	12 0	12 10	12 30	13 0	13 30
11	0 27	0 55	1 22	1 50	2 37	3 0	4 30	5 0	5 30	6 15	7 0	7 30	8 7	8 45	9 22	10 0	10 40	11 12	11 45	12 10	12 35	13 0	13 30	14 0
12	0 30	1 0	1 30	2 0	2 45	3 0	4 40	5 15	6 0	6 45	7 30	8 0	8 40	9 20	10 0	10 40	11 12	11 45	12 10	12 35	13 0	13 30	14 0	14 30
13	0 32	1 5	1 37	2 10	2 45	3 15	4 52	5 30	6 15	7 0	7 45	8 30	9 12	9 55	10 37	11 12	11 45	12 10	12 35	13 0	13 30	14 0	14 30	15 0
14	0 35	1 10	1 52	2 30	3 0	3 45	5 27	6 10	6 55	7 40	8 25	9 10	9 45	10 30	11 15	12 0	12 35	13 10	13 35	14 0	14 30	15 0	15 30	16 0
15	0 37	1 15	2 0	2 45	3 15	4 0	5 40	6 25	7 10	7 55	8 40	9 25	10 10	10 55	11 40	12 25	13 10	13 45	14 20	14 55	15 30	16 0	16 30	17 0
16	0 40	1 20	2 10	3 0	3 45	4 15	6 0	6 50	7 35	8 20	9 5	9 40	10 25	11 10	11 55	12 40	13 25	14 10	14 55	15 40	16 15	17 0	17 30	18 0
17	0 42	1 25	2 15	3 10	4 0	4 45	6 30	7 20	8 5	8 50	9 35	10 20	11 5	11 50	12 35	13 20	14 5	14 50	15 35	16 20	17 5	17 30	18 0	18 30
18	0 45	1 30	2 20	3 15	4 10	5 0	6 45	7 35	9 0	9 45	10 30	11 15	12 0	12 45	13 30	14 15	15 0	15 45	16 30	17 15	18 0	18 30	19 0	19 30
19	0 47	1 35	2 25	3 20	4 15	5 10	7 0	7 50	9 40	10 30	11 15	12 0	12 45	13 30	14 15	15 0	15 45	16 30	17 15	18 0	18 30	19 0	19 30	20 0
20	0 50	1 40	2 30	3 25	4 20	5 15	7 5	7 55	9 45	10 35	11 20	12 5	12 50	13 35	14 20	15 5	15 50	16 35	17 20	18 5	18 30	19 0	19 30	20 0
21	0 52	1 45	2 35	3 30	4 25	5 20	8 0	8 50	9 50	10 40	11 25	13 0	13 45	14 30	15 15	16 0	16 45	17 30	18 15	19 0	19 30	20 0	20 30	21 0
22	0 55	1 50	2 40	3 35	4 30	5 25	8 5	8 55	9 55	10 45	11 30	14 0	14 45	15 30	16 15	17 0	17 45	18 30	19 15	20 0	20 30	21 0	21 30	22 0
23	0 57	1 55	2 45	3 40	4 35	5 30	9 0	9 55	10 50	11 40	12 25	15 0	15 45	16 30	17 15	18 0	18 45	19 30	20 15	21 0	21 30	22 0	22 30	23 0
24	1 0	2 0	2 50	3 45	4 40	5 35	10 0	10 50	11 45	12 35	13 20	16 0	16 45	17 30	18 15	19 0	19 45	20 30	21 15	22 0	22 30	23 0	23 30	24 0
	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.
1	0 5	0 7	0 10	0 12	0 15	0 17	0 20	0 22	0 25	0 27	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0	1 5
2	0 10	0 15	0 20	0 25	0 30	0 35	0 40	0 45	0 50	0 55	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0	2 7
3	0 15	0 22	0 30	0 37	0 45	0 52	1 0	1 7	1 15	1 22	1 30	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 10
4	0 20	0 30	0 40	0 50	1 0	1 10	1 20	1 30	1 40	1 50	2 0	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 12
5	0 25	0 37	0 50	1 3	1 15	1 28	1 40	1 52	2 5	2 17	2 30	2 42	2 55	3 7	3 20	3 32	3 45	3 58	4 10	4 23	4 35	4 47	5 0	5 15
6	0 30	0 45	1 0	1 15	1 30	1 45	2 0	2 15	2 30	2 45	3 0	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 17
7	0 35	0 52	1 10	1 27	1 45	2 2	2 20	2 37	2 55	3 12	3 30	3 47	4 5	4 22	4 40	4 57	5 15	5 33	5 50	6 8	6 25	6 42	7 0	7 20
8	0 40	1 0	1 20	1 40	2 0	2 20	2 40	3 0	3 20	3 40	4 0	4 20	4 40	4 60	5 0	5 20	5 40	6 0	6 20	6 40	7 0	7 20	8 0	8 25
9	0 45	1 7	1 30	1 52	2 15	2 37	3 0	3 22	3 45	4 7	4 30	4 52	5 15	5 37	6 0	6 22	6 45	7 8	7 30	8 10	8 30	9 0	9 25	
10	0 50	1 15	1 40	2 5	2 30	2 55	3 20	3 45	4 10	4 35	5 0	5 25	5 50	6 15	6 40	7 5	7 30	8 5	9 25	10 5	11 25	12 5	13 25	
11	0 55	1 22	1 50	2 17	2 45	3 12	3 40	4 7	5 5	6 30	7 0	7 30	8 5	9 25	10 50	11 5	12 30	13 5	14 25	15 5	16 25	17 5	18 25	
12	1 0	1 30	2 0	2 30	3 0	3 30	4 0	4 30	5 0	5 30	6 0	6 30	7 0	7 30	8 0	8 30	9 0	9 30	10 0	10 30	11 0	11 30	12 0	12 30
13	1 5	1 37	2 10	2 42	3 15	3 47	4 20	4 52	5 25	5 57	6 30	7 2	7 35	8 7	8 40	9 12	9 45	10 15	10 45	11 15	11 45	12 15	12 45	
14	1 10	1 45	2 20	2 57	3 30	4 5	4 40	5 15	5 50	6 25	7 0	7 45	8 10	8 45	9 20	9 55	10 30	11 5	11 40	12 15	12 50	13 25	14 0	
15	1 15	1 52	2 30	3 7	3 45	4 25	5 0	5 37	6 15	6 52	7 30	8 7	8 45	9 22	10 0	10 30	11 15	11 50	12 25	13 0	13 35	14 10	14 45	
16	1 20	2 0	2 40	3 20	4 0	4 40	5 20	6 0	6 40	7 20	8 0	8 40	9 20	10 0	10 40	11 20	12 0	12 40	13 20	14 0	14 40	15 20	16 0	
17	1 25	2 7	2 50	3 32	4 15	4 57	5 40	6 22	7 5	7 47	8 30	9 12	9 55	10 37	11 20	12 2	12 45	13 28	14 10	15 5	16 40	17 25	18 10	

Hourly Variation of the SUN's declination when two hours or 30 degrees East or West from London.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.
1	0 7	0 10	0 12	0 15	0 17	0 20	0 22	0 25	0 27	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0	1 5	1 10
2	0 15	0 20	0 25	0 30	0 35	0 40	0 45	0 50	0 55	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0	2 7	2 15
3	0 22	0 30	0 38	0 45	0 52	1 0	1 7	1 15	1 22	1 30	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 10	3 20
4	0 30	0 40	0 51	1 0	1 10	1 20	1 30	1 40	1 50	2 0	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 12	4 25
5	0 37	0 50	1 3	1 15	1 28	1 40	1 52	2 5	2 17	2 30	2 42	2 55	3 7	3 20	3 32	3 45	3 58	4 10	4 23	4 35	4 47	5 0	5 15	5 30
6	0 45	1 0	1 15	1 30	1 45	2 0	2 15	2 30	2 45	3 0	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 7	6 35
7	0 52	1 10	1 27	1 45	2 2	2 20	2 37	2 55	3 12	3 30	3 47	4 5	4 22	4 40	4 57	5 15	5 33	5 50	6 8	6 25	6 42	7 0	7 20	7 40
8	1 0	1 20	1 40	2 0	2 20	2 40	3 0	3 20	3 40	4 0	4 20	4 40	5 0	5 20	5 40	6 0	6 20	6 40	7 0	7 20	7 40	8 0	8 22	8 45
9	1 7	1 30	1 52	2 15	2 37	3 0	3 22	3 45	4 7	4 30	4 52	5 15	5 37	6 0	6 22	6 45	7 8	7 30	7 53	8 15	8 38	9 0	9 25	9 50
10	1 15	1 40	2 5	2 30	2 55	3 20	3 45	4 10	4 35	5 0	5 25	5 50	6 15	6 40	7 5	7 30	7 55	8 20	8 45	9 10	9 35	10 0	10 27	10 55
11	1 22	1 50	2 17	2 45	3 12	3 40	4 7	4 35	5 2	5 30	5 57	6 25	6 52	7 20	7 47	8 15	8 43	9 10	8 38	10 5	10 53	11 0	11 30	11 58
12	1 30	2 0	2 30	3 0	3 30	4 0	4 30	5 0	5 30	6 0	6 30	7 0	7 30	8 0	8 30	9 0	9 30	10 0	10 30	11 0	11 30	12 0	12 30	12 58
13	1 37	2 10	2 42	3 15	3 47	4 20	4 52	5 25	5 57	6 30	7 2	7 35	8 7	8 40	9 12	9 45	10 18	10 50	11 23	12 55	13 28	14 0	14 35	14 10
14	1 45	2 20	2 57	3 30	4 5	4 40	5 15	5 50	6 25	7 0	7 45	8 10	8 45	9 20	9 55	10 30	11 5	11 40	12 15	12 50	13 25	14 0	14 37	15 15
15	1 52	2 30	3 7	3 45	4 25	5 0	5 37	6 15	6 52	7 39	8 7	8 45	9 22	10 0	10 37	11 15	11 53	12 30	13 8	13 45	14 23	15 0	15 40	16 20
16	2 0	2 40	3 20	4 0	4 40	5 20	6 0	6 40	7 20	8 0	8 40	9 20	10 0	10 40	11 20	12 0	12 40	13 20	14 0	14 40	15 20	16 0	16 42	17 25
17	2 7	2 50	3 32	4 15	4 57	5 40	6 22	7 5	7 47	8 30	9 12	9 55	10 37	11 20	12 2	12 45	13 28	14 10	14 53	15 35	16 18	17 0	17 45	18 30
18	2 15	3 0	3 45	4 30	5 15	6 0	6 45	7 30	8 15	9 0	9 45	10 30	11 15	12 0	12 45	13 30	14 15	15 0	15 45	16 30	17 15	18 0	18 47	19 35
19	2 22	3 10	3 57	4 45	5 32	6 20	7 7	7 55	8 42	9 30	10 17	11 5	12 40	13 28	14 15	15 0	15 45	16 30	17 15	18 0	18 47	19 35	20 20	20 40
20	2 30	3 20	4 10	5 0	5 50	6 40	7 30	8 20	9 10	10 0	10 50	11 40	12 30	13 20	14 10	15 0	15 45	16 30	17 15	18 0	18 47	19 35	20 20	20 40
21	2 37	3 30	4 22	5 15	6 7	7 0	7 52	8 45	9 37	10 30	11 22	12 15	13 7	14 0	14 53	15 45	16 38	17 30	18 23	19 15	20 8	21 0	21 55	22 50
22	2 45	3 40	4 35	5 30	6 25	7 20	8 15	9 10	10 5	11 0	11 55	12 50	13 45	14 40	15 35	16 30	17 25	18 19	19 15	20 10	21 5	22 0	22 57	23 55
23	2 52	3 50	4 47	5 45	6 42	7 40	8 37	9 35	10 32	11 30	12 27	13 25	14 22	15 20	16 18	17 15	18 13	19 10	20 8	21 5	22 3	23 0	24 0	24 0
24	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0	13 0	14 0	15 0	16 0	17 0	18 0	19 0	20 0	21 0	22 0	23 0	24 0	25 0	26 0
	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.

THE

Hourly Variation of the SUN's declination when three hours or 45 degrees East or West from London.

[illegible]

Hourly Variation of the SUN's declination when four hours or 60 degrees East or West from London.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.
1	0 12	0 15	0 17	0 20	0 22	0 25	0 27	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0	1 5	1 10	1 15	1 20
2	0 25	0 30	0 35	0 40	0 45	0 50	0 55	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0	2 7	2 15	2 22	2 30
3	0 37	0 45	0 52	1 0	1 7	1 15	1 22	1 30	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 10	3 20	3 30	3 40
4	0 51	1 0	1 10	1 20	1 30	1 40	1 50	2 0	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 12	4 25	4 37	4 50
5	1 3	1 15	1 28	1 40	1 52	2 5	2 17	2 30	2 42	2 55	3 7	3 20	3 32	3 45	3 58	4 10	4 23	4 35	4 47	5 0	5 15	5 30	5 45	6 0
6	1 15	1 30	1 45	2 0	2 15	2 30	2 45	3 0	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 17	6 35	6 52	7 10
7	1 27	1 45	2 2	2 20	2 37	2 55	3 12	3 30	3 47	4 5	4 22	4 40	4 57	5 15	5 33	5 50	6 7	6 25	6 42	7 0	7 20	7 40	8 0	8 20
8	1 40	2 0	2 20	2 40	3 0	3 20	3 40	4 0	4 20	4 40	5 0	5 20	5 40	6 0	6 20	6 40	7 0	7 20	7 40	8 0	8 22	8 45	9 7	9 30
9	1 52	2 15	2 37	3 0	3 22	3 45	4 7	4 30	4 52	5 15	5 37	6 0	6 22	6 45	7 8	7 30	7 53	8 15	8 38	9 0	9 25	9 50	10 15	10 40
10	2 5	2 30	2 55	3 20	3 45	4 10	4 35	5 0	5 25	5 50	6 15	6 40	7 5	7 30	7 55	8 20	8 45	9 10	9 35	10 0	10 27	10 55	11 22	11 50
11	2 17	2 45	3 12	3 40	4 7	4 35	5 20	6 0	6 30	7 0	7 30	8 0	8 30	9 0	9 30	10 0	10 30	11 0	11 30	12 0	12 30	13 0	13 30	14 0
12	2 30	3 0	3 30	4 0	4 30	5 0	5 30	6 0	6 30	7 0	7 30	8 0	8 30	9 0	9 30	10 0	10 30	11 0	11 30	12 0	12 30	13 0	13 30	14 0
13	2 42	3 15	3 47	4 20	4 52	5 25	5 57	6 30	7 0	7 35	8 7	8 40	9 12	9 45	10 18	10 50	11 23	11 55	12 28	13 0	13 35	14 10	14 45	15 20
14	2 55	3 30	4 5	4 40	5 15	5 50	6 25	7 0	7 45	8 10	8 45	9 20	9 55	10 30	11 5	11 40	12 15	12 50	13 25	14 0	14 37	15 15	15 52	16 30
15	3 7	3 45	4 25	5 0	5 37	6 15	6 52	7 30	8 7	8 45	9 22	10 0	10 37	11 15	11 53	12 30	13 7	13 45	14 23	15 0	15 40	16 20	17 0	17 40
16	3 20	4 0	4 40	5 20	6 0	6 40	7 20	8 0	8 40	9 20	10 0	10 40	11 20	12 0	12 40	13 20	14 0	14 40	15 20	16 0	16 42	17 25	18 0	18 50
17	3 32	4 15	4 57	5 40	6 22	7 5	7 47	8 30	9 12	9 55	10 37	11 20	12 2	12 45	13 28	14 10	14 53	15 35	16 18	17 0	17 45	18 30	19 15	20 0
18	3 45	4 30	5 15	6 0	6 45	7 30	8 15	9 0	9 45	10 30	11 15	12 0	12 45	13 30	14 15	15 0	15 45	16 30	17 15	18 0	18 47	19 35	20 22	21 0
19	3 57	4 45	5 32	6 20	7 7	7 55	8 42	9 30	10 17	11 5	11 52	12 40	13 28	14 15	15 3	16 18	17 3	18 18	19 3	20 0	20 52	21 40	22 28	23 0
20	4 10	5 0	5 50	6 40	7 30	8 20	9 10	10 0	10 50	11 40	12 30	13 20	14 10	15 0	16 0	17 0	18 0	19 0	20 0	21 0	21 50	22 40	23 30	24 0
21	4 22	5 15	6 7	7 0	7 52	8 45	9 37	10 30	11 22	12 15	13 7	14 0	15 3	16 15	17 3	18 18	19 3	20 18	21 3	22 0	22 50	23 40	24 30	25 0
22	4 35	5 30	6 25	7 20	8 15	9 10	10 5	11 0	11 55	12 50	13 45	14 40	15 35	16 30	17 25	18 20	19 15	20 10	21 5	22 5	23 55	24 45	25 35	26 0
23	4 47	5 45	6 42	7 40	8 37	9 35	10 32	11 30	12 27	13 25	14 22	15 20	16 18	17 15	18 13	19 10	20 8	21 5	22 5	23 5	24 5	25 5	26 5	27 0
24	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0	13 0	14 0	15 0	16 0	17 0	18 0	19 0	20 0	21 0	22 0	23 0	24 0	25 0	26 0	27 0	28 0
A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
1	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.
2	0 15	0 17	0 20	0 22	0 25	0 27	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0	1 5	1 10	1 15	1 20	1 25
3	0 30	0 35	0 40	0 45	0 50	0 55	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0	2 7	2 15	2 30	2 37	2 45
4	0 45	0 52	1 0	1 7	1 15	1 22	1 30	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 10	3 20	3 30	3 40	3 50
5	1 0	1 10	1 20	1 30	1 40	1 50	2 0	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 12	4 25	4 40	4 50	5 0
6	1 15	1 28	1 40	1 52	2 5	2 17	2 30	2 42	2 55	3 7	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 17	6 35	6 50	7 10	7 27
7	1 30	1 45	2 0	2 15	2 30	2 45	3 0	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 17	6 35	6 50	7 10	7 27
8	1 45	2 2	2 20	2 37	2 55	3 12	3 30	3 47	4 5	4 22	4 40	4 57	5 15	5 33	5 50	6 8	6 25	6 42	7 0	7 20	7 40	8 0	8 40	9 52
9	2 15	2 37	3 0	3 22	3 45	4 7	4 30	4 52	5 15	5 37	6 0	6 22	6 45	7 8	7 30	7 45	8 8	8 38	9 0	9 25	9 50	10 11	10 41	11 5
10	2 30	2 55	3 20	3 45	4 10	4 35	5 0	5 25	5 50	6 15	6 40	7 5	7 30	8 8	8 20	8 45	9 10	9 35	10 10	10 27	10 55	11 15	11 45	12 10
11	2 45	3 12	3 40	4 7	4 35	5 2	5 30	5 57	6 25	6 52	7 20	7 47	8 10	8 43	9 10	9 38	10 5	10 33	11 11	11 30	12 12	12 30	13 0	13 30
12	3 0	3 30	4 0	4 30	5 0	5 30	6 0	6 30	7 0	7 30	8 0	8 30	9 0	9 30	10 0	10 30	11 0	11 30	12 0	12 30	13 0	14 0	14 42	15 13
13	3 15	3 47	4 20	4 52	5 25	5 57	6 30	7 2	7 35	8 7	8 40	9 12	9 45	10 18	10 51	11 24	12 0	12 30	13 12	13 45	14 18	15 0	15 42	16 15
14	3 30	4 5	4 40	5 15	5 50	6 25	7 0	7 45	8 10	8 45	9 20	9 55	10 30	11 5	12 38	13 13	13 48	14 23	15 0	15 35	16 10	16 45	17 20	17 55
15	3 45	4 25	5 0	5 37	6 15	6 52	7 30	8 7	8 45	9 22	10 0	10 37	11 15	11 53	12 30	13 8	14 15	15 0	15 45	16 20	16 55	17 30	18 5	18 40
16	4 0	4 40	5 20	6 0	6 40	7 20	8 0	8 40	9 20	10 0	10 40	11 20	12 0	12 40	13 20	14 0	14 40	15 20	16 0	16 40	17 20	18 0	18 40	19 20
17	4 15	4 57	5 40	6 22	7 5	7 47	8 30	9 12	9 55	10 37	11 20	12 2	13 5	14 45	15 28	16 11	17 0	17 45	18 30	19 15	20 0	20 45	21 30	22 15
18	4 30	5 15	6 0	6 45	7 30	8 15	9 0	9 45	10 30	11 15</														

Hourly Variation of the SUN's declination when six hours or 90 degrees East or West from London.

	11	10	9	8	7	6	5	4	3	2	1	24
1	0 17	0 20	0 22	0 25	0 27	0 30	0 32	0 35	0 37	0 40	0 42	0 45
2	0 35	0 40	0 45	0 50	0 55	1 0	1 5	1 10	1 15	1 20	1 25	1 30
3	0 52	1 0	1 7	1 15	1 22	1 30	1 37	1 45	1 52	2 0	2 7	2 15
4	1 10	1 20	1 30	1 40	1 50	2 0	2 10	2 20	2 30	2 40	2 50	3 0
5	1 28	1 40	1 52	2 5	2 17	2 30	2 42	2 55	3 7	3 20	3 32	3 45
6	1 45	2 0	2 15	2 30	2 45	3 0	3 15	3 30	3 45	4 0	4 15	4 30
7	2 22	2 20	2 37	2 55	3 12	3 30	3 47	4 5	4 22	4 40	4 57	5 15
8	2 20	2 40	3 0	3 20	3 40	4 0	4 20	4 40	5 0	5 20	5 40	6 0
9	2 37	3 0	3 22	3 45	4 7	4 30	4 52	5 15	5 37	6 0	6 22	6 45
10	2 55	3 20	3 45	4 10	4 35	5 0	5 25	5 50	6 15	6 40	7 5	7 30
11	3 12	3 40	4 7	4 35	5 2	5 30	5 57	6 25	6 52	7 20	7 47	8 15
12	3 30	4 0	4 30	5 0	5 30	6 0	6 30	7 0	7 30	8 0	8 30	9 0
13	3 47	4 20	4 52	5 25	5 57	6 30	7 2	7 35	8 7	8 40	9 12	9 45
14	4 5	4 40	5 15	5 50	6 25	7 0	7 45	8 10	8 45	9 20	9 55	10 30
15	4 25	5 0	5 37	6 15	6 52	7 30	8 7	8 45	9 22	10 0	10 37	11 15
16	4 40	5 20	6 0	6 40	7 20	8 0	8 40	9 20	10 0	10 40	11 20	12 0
17	4 57	5 40	6 22	7 5	7 47	8 30	9 12	9 55	10 37	11 20	12 2	12 45
18	5 15	6 0	6 45	7 30	8 15	9 0	9 45	10 30	11 15	12 0	12 45	13 30
19	5 32	6 20	7 7	7 55	8 42	9 30	10 17	11 5	12 30	13 10	14 0	14 45
20	5 50	6 40	7 30	8 20	9 10	10 0	10 50	11 40	12 30	13 20	14 10	15 0
21	6 7	7 0	7 52	8 45	9 37	10 30	11 22	12 15	13 7	14 0	15 3	16 15
22	6 25	7 20	8 15	9 10	10 5	11 0	11 55	12 50	13 45	14 40	15 35	16 30
23	6 42	7 40	8 37	9 35	10 32	11 30	12 27	13 25	14 22	15 20	16 18	17 15
24	7 0	8 0	9 0	10 0	11 0	12 0	13 0	14 0	15 0	16 10	17 0	18 0

[illegible]

T H E

Hourly Variation of the SUN's declination when eight hours or 120 degrees East or West from London.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.
1	0 22	0 25	0 27	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40
2	0 45	0 50	0 55	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0
3	1 7	1 15	1 22	1 30	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 10	4 20
4	1 30	1 40	1 50	2 0	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 12	4 25	4 37	4 50	5 3	5 15	5 28	5 40
5	1 52	2 5	2 17	2 30	2 42	2 55	3 7	3 20	3 32	3 45	3 58	4 10	4 23	4 35	4 47	5 0	5 15	5 30	5 45	6 0	6 15	6 30	6 45	7 0
6	2 15	2 30	2 45	3 0	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 17	6 35	6 52	7 10	7 27	7 45	8 2	8 20
7	2 37	2 55	3 12	3 30	3 47	4 5	4 22	4 40	4 57	5 15	5 33	5 50	6 8	6 25	6 42	7 0	7 20	7 40	8 0	8 20	8 40	9 0	9 20	9 40
8	3 0	3 20	3 40	4 0	4 20	4 40	5 0	5 20	5 40	6 0	6 20	6 40	7 0	7 20	7 40	8 0	8 22	8 45	9 7	9 30	9 52	10 15	10 37	10 58
9	3 22	3 45	4 7	4 30	4 52	5 15	5 37	6 0	6 22	6 45	7 8	7 30	7 53	8 15	8 38	9 0	9 25	9 50	10 10	10 40	11 11	11 41	12 11	12 30
10	3 45	4 10	4 35	5 0	5 25	5 50	6 15	6 40	7 5	7 30	7 55	8 20	8 45	9 10	9 35	10 0	10 27	10 55	11 11	11 41	12 11	12 41	13 11	13 30
11	4 7	4 35	5 2	5 30	5 57	6 25	6 52	7 20	7 47	8 15	8 43	9 10	9 38	10 5	10 33	11 0	11 30	12 0	12 30	13 0	13 30	14 0	14 30	14 50
12	4 30	5 0	5 30	6 0	6 30	7 0	7 30	8 0	8 30	9 0	9 30	10 0	10 30	11 0	11 30	12 0	12 30	13 0	13 30	14 0	14 30	15 0	15 30	15 50
13	4 52	5 25	5 57	6 30	7 2	7 35	8 7	8 40	9 12	9 45	10 18	10 50	11 23	12 5	12 28	13 0	13 35	14 0	14 35	15 0	15 35	16 0	16 35	16 55
14	5 15	5 50	6 25	7 0	7 45	8 10	8 45	9 20	9 55	10 30	11 5	11 40	12 15	12 50	13 25	14 0	14 37	15 0	15 37	16 0	16 37	17 0	17 40	18 0
15	5 37	6 15	6 52	7 30	8 7	8 45	9 22	10 0	10 37	11 15	11 53	12 30	13 8	13 45	14 23	15 0	15 40	16 0	16 37	17 0	17 40	18 20	19 0	19 40
16	6 0	6 40	7 20	8 0	8 40	9 20	10 0	10 40	11 20	12 0	12 40	13 20	14 0	14 40	15 20	16 0	16 42	17 25	18 0	18 40	19 20	20 0	20 40	21 0
17	6 22	7 5	7 47	8 30	9 12	9 55	10 37	11 20	12 2	12 45	13 28	14 10	14 53	15 35	16 18	17 0	17 45	18 30	19 15	20 0	20 45	21 30	22 15	22 50
18	6 45	7 30	8 15	9 0	9 45	10 38	11 22	12 5	12 48	13 31	14 15	15 0	15 45	16 30	17 15	18 0	18 47	19 35	20 22	21 10	21 57	22 45	23 32	24 19
19	7 7	7 55	8 42	9 30	10 10	10 51	11 30	12 13	12 56	13 39	14 22	15 5	15 48	16 31	17 18	18 0	18 50	19 40	20 30	21 20	22 10	23 0	23 50	24 40
20	7 30	8 20	9 10	10 0	10 40	11 20	12 0	12 40	13 20	14 0	14 40	15 20	16 0	16 40	17 20	18 0	18 50	19 40	20 30	21 20	22 10	23 0	23 50	24 40
21	7 52	8 45	9 37	10 30	11 22	12 5	13 13	14 0	14 53	15 45	16 38	17 30	18 23	19 15	20 8	21 0	21 55	22 45	23 35	24 25	25 15	26 5	26 55	27 45
22	8 15	9 10	10 5	11 0	11 55	12 45	13 35	14 25	15 15	16 5	16 45	17 35	18 25	19 15	20 5	21 22	22 15	23 5	23 55	24 45	25 35	26 25	27 15	28 5
23	8 37	9 35	10 32	11 30	12 27	13 15	14 5	15 15	16 5	17 15	18 5	19 15	20 5	21 22	22 15	23 5	24 15	25 5	26 55	27 45	28 35	29 25	30 15	31 5
24	9 0	10 0	11 0	12 0	13 0	14 0	15 0	16 0	17 0	18 0	19 0	20 0	21 0	22 0	23 0	24 0	25 0	26 0	27 0	28 0	29 0	30 0	31 0	32 0
A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	A. M.	P. M.	P. M.	P. M.	P. M.	P. M.	P. M.	P. M.	P. M.

[illegible]

Hourly Variation of the SUN's declination when ten hours or 150 degrees East or West from London.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
1	0 27	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50
2	0 55	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0	2 7	2 15	2 22	2 30	3 37	2 45	2 52	3 0	3 7	3 15
3	1 22	1 30	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 10	4 20	4 30	4 40
4	1 50	2 0	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 12	4 25	4 37	4 50	5 3	5 15	5 28	5 40	5 52	6 5
5	2 17	2 30	2 42	2 55	3 7	3 20	3 32	3 45	3 58	4 10	4 23	4 35	4 47	5 0	5 15	5 30	5 45	6 0	6 15	6 30	6 45	7 0	7 15	7 30
6	2 45	3 0	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 17	6 35	6 52	7 10	7 27	7 45	8 20	8 37	8 55	9 6
7	3 12	3 30	3 47	4 5	4 22	4 40	4 57	5 15	5 33	5 50	6 8	6 25	6 42	7 0	7 20	7 40	8 0	8 20	8 40	9 0	9 20	9 40	10 0	10 20
8	3 40	4 0	4 20	4 40	5 0	5 20	5 40	6 0	6 20	6 40	7 0	7 20	7 40	8 0	8 22	8 45	9 7	9 30	9 52	10 15	10 37	11 0	11 22	11 45
9	4 7	4 30	4 52	5 15	5 37	6 0	6 22	6 45	7 8	7 30	7 53	8 15	8 38	9 0	9 25	9 50	10 15	10 40	11 5	11 30	11 55	12 20	12 45	13 0
10	4 35	5 0	5 25	5 50	6 15	6 40	7 5	7 30	7 55	8 20	8 45	9 10	9 35	10 0	10 27	10 55	11 22	11 50	12 17	12 45	13 12	13 40	14 7	14 35
11	5 2	5 30	5 57	6 25	6 52	7 20	7 47	8 15	8 43	9 10	9 38	10 5	10 33	11 0	11 30	12 0	12 30	13 0	13 30	14 0	14 30	15 0	15 30	16 0
12	5 30	6 0	6 30	7 0	7 30	8 0	8 30	9 0	9 30	10 0	10 30	11 0	11 30	12 0	12 30	13 0	13 30	14 0	14 30	15 0	15 30	16 0	16 30	17 0
13	5 37	6 30	7 2	7 35	8 7	8 40	9 12	9 45	10 18	10 50	11 23	12 55	13 12	14 0	14 35	15 13	15 37	16 14	16 42	17 15	17 48	18 15	18 50	19 13
14	6 25	7 0	7 45	8 10	8 45	9 20	9 55	10 30	11 5	11 40	12 15	13 45	14 25	15 0	15 40	16 15	16 45	17 18	17 51	18 24	18 57	19 30	20 0	20 15
15	6 52	7 30	8 7	8 45	9 22	10 0	10 37	11 15	12 40	13 12	14 45	15 12	16 13	17 0	17 40	18 20	19 0	19 40	20 18	20 45	21 12	21 40	22 18	23 0
16	7 20	8 0	8 40	9 20	10 0	10 40	11 20	12 0	12 40	13 20	14 0	14 40	15 20	16 0	16 42	17 25	18 7	18 50	19 32	20 15	20 42	21 10	21 38	22 0
17	7 47	8 30	9 12	9 55	10 37	11 20	12 2	12 45	13 28	14 10	14 53	15 35	16 18	17 0	17 45	18 30	19 15	20 0	20 45	21 30	22 15	23 0	23 45	24 30

Hourly Variation of the SUN's declination when eleven hours or 165 degrees East or West from London.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.	M.S.
1	0 30	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55
2	1 0	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0	2 5	2 10	2 15	2 20	2 25	2 30	2 35	2 40	2 45	2 50	2 55
3	1 30	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 10	4 20	4 30	4 40	4 50
4	2 0	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 10	4 20	4 30	4 40	4 50	5 0	5 10	5 20	5 30	5 40	5 50
5	2 30	2 42	2 55	3 7	3 20	3 32	3 45	3 58	4 10	4 23	4 35	4 47	5 0	5 15	5 30	5 45	6 0	6 15	6 30	6 45	7 0	7 15	7 30	7 45
6	3 0	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 15	6 30	6 45	7 0	7 15	7 30	7 45	8 0	8 15	8 30	8 45
7	3 30	3 47	4 5	4 22	4 40	4 57	5 15	5 33	5 50	6 8	6 25	6 42	7 0	7 15	7 30	7 45	8 0	8 15	8 30	8 45	9 0	9 15	9 30	9 45
8	4 0	4 20	4 40	5 0	5 20	5 40	6 0	6 20	6 40	7 0	7 15	7 35	8 0	8 20	8 40	9 0	9 10	9 30	9 50	10 0	10 20	10 40	11 0	11 20
9	4 30	4 52	5 15	5 37	6 0	6 22	6 45	7 8	7 30	8 45	9 10	9 35	10 0	10 25	10 50	11 10	11 30	11 50	12 10	12 30	12 50	13 10	13 30	13 50
10	5 0	5 25	5 50	6 15	6 40	7 5	7 30	8 55	9 10	9 38	10 10	10 33	11 0	11 25	11 50	12 15	12 40	13 5	14 30	14 55	15 10	15 35	15 60	16 15
11	5 30	5 57	6 25	6 52	7 20	8 30	9 0	9 30	10 10	11 0	11 30	12 10	12 40	13 10	13 40	14 10	14 40	15 10	15 40	16 10	16 40	17 10	17 40	18 10
12	6 0	6 30	7 0	7 30	8 0	9 0	9 15	10 10	11 10	12 10	13 10	14 10	15 10	16 10	17 10	18 10	19 10	20 10	21 10	22 10	23 10	24 10	25 10	26 10
13	6 30	7 2	8 8	8 45	9 20	10 30	11 0	11 40	12 40	13 40	14 40	15 40	16 40	17 40	18 40	19 40	20 40	21 40	22 40	23 40	24 40	25 40	26 40	27 40
14	7 0	7 45	8 10	8 45	9 20	10 30	11 15	12 10	13 10	14 10	15 10	16 10	17 10	18 10	19 10	20 10	21 10	22 10	23 10	24 10	25 10	26 10	27 10	28 10
15	7 30	8 7	8 45	9 22	10 10	11 20	12 12	13 12	14 12	15 12	16 12	17 12	18 12	19 12	20 12	21 12	22 12	23 12	24 12	25 12	26 12	27 12	28 12	29 12
16	8 0	8 40	9 20	10 10	11 40	12 20	13 12	14 12	15 12	16 12	17 12	18 12	19 12	20 12	21 12	22 12	23 12	24 12	25 12	26 12	27 12	28 12	29 12	30 12
17	8 30	9 12	9 55	10																				
18	9 0	9 45	10 30	11 15	12 0	12 45	13 30	14 15	15 0	15 45	16 30	17 15	18 0	18 45	19 30	20 15	21 0	21 45	22 30	23 15	24 0	24 45	25 30	26 15
19	9 30	10 17	11 5	12 40	13 30	14 15	15 0	15 45	16 30	17 15	18 0	18 45	19 30	20 15	21 0	21 45	22 30	23 15	24 0	24 45	25 30	26 15	27 0	27 45
20	10 0	10 50	11 40	12 30	13 20	14 10	15 0	15 45	16 30	17 15	18 0	18 45	19 30	20 15	21 0	21 45	22 30	23 15	24 0	24 45	25 30	26 15	27 0	27 45
21	10 30	11 22	12 15	13 7	14 0	15 3	16 15	17 0	17 45	18 30	19 15	20 0	20 45	21 30	22 15	23 0	23 45	24 30	25 15	26 0	26 45	27 30	28 15	29 0
22	11 0	11 55	12 50	13 45	14 40	15 35	16 30	17 25	18 20	19 15	20 10	21 5	22 0	22 45	23 40	24 35	25 30	26 25	27 20	28 15	29 10	30 5	31 0	31 45
23	11 30	12 27	13 25	14 22	15 20	16 18	17 15	18 13	19 10	20 8	21 5	22 3	23 0	23 45	24 40	25 35	26 30	27 25	28 20	29 15	30 10	31 5	32 0	32 45
24	12 0	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	24 25	25 26	26 27	27 28	28 29	29 30	30 31	31 32	32 33	33 34	34 35	35 36
A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.

T H E

Hourly Variation of the SUN's declination when twelve hours or 180 degrees East or West from London.

	11	10	9	8	7	6	5	4	3	2	1	12	11	10	9	8	7	6	5	4	3	2	1	24
	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.
1	0 32	0 35	0 37	0 40	0 42	0 45	0 47	0 50	0 52	0 55	0 57	1 0	1 1	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0
2	1 5	1 10	1 15	1 20	1 25	1 30	1 35	1 40	1 45	1 50	1 55	2 0	2 1	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 7	3 15	3 22	3 30
3	1 37	1 45	1 52	2 0	2 7	2 15	2 22	2 30	2 37	2 45	2 52	3 0	3 1	3 20	3 30	3 40	3 50	4 0	4 10	4 20	4 30	4 40	4 50	5 0
4	2 10	2 20	2 30	2 40	2 50	3 0	3 10	3 20	3 30	3 40	3 50	4 0	4 1	4 25	4 37	4 50	5 3	5 15	5 28	5 40	5 52	6 5	6 17	6 30
5	2 42	2 55	3 7	3 20	3 32	3 45	3 55	4 10	4 23	4 35	4 47	5 0	5 1	5 30	5 45	6 0	6 15	6 30	6 45	7 0	7 15	7 30	7 45	8 0
6	3 15	3 30	3 45	4 0	4 15	4 30	4 45	5 0	5 15	5 30	5 45	6 0	6 1	6 35	6 52	7 10	7 27	7 45	8 0	8 20	8 37	8 55	9 12	9 30
7	3 47	4 5	4 22	4 40	4 57	5 15	5 33	5 50	6 7	6 25	6 42	7 0	7 1	7 40	8 0	8 20	8 40	9 0	9 20	9 40	10 0	10 20	10 40	11 0
8	4 20	4 40	5 0	5 20	5 40	6 0	6 20	6 40	7 0	7 20	7 40	8 0	8 1	8 45	9 7	9 30	9 52	10 15	10 37	11 0	11 22	11 45	12 7	12 30
9	4 52	5 15	5 37	6 0	6 22	6 45	7 8	7 30	7 53	8 15	8 38	9 0	9 1	9 50	10 15	10 40	11 11	11 30	11 55	12 13	12 40	13 14	13 35	14 0
10	5 25	5 50	6 15	6 40	7 4	7 30	7 55	8 20	8 45	9 10	9 35	10 0	10 1	10 55	11 22	11 50	12 17	12 45	13 13	13 40	14 14	14 35	15 15	15 30
11	5 57	6 25	6 52	7 20	7 47	8 15	8 43	9 10	9 38	10 5	10 33	11 0	11 1	11 30	12 0	12 13	12 42	13 14	13 41	14 15	14 48	15 18	16 0	16 10
12	6 30	7 0	7 30	8 0	8 30	9 0	9 30	10 0	10 30	11 0	11 30	12 0	12 1	12 30	13 0	13 14	13 45	14 15	14 45	15 19	15 52	16 20	17 0	17 10
13	7 2	7 35	8 7	8 40	9 12	9 45	10 18	10 51	11 23	11 55	12 28	13 0	13 1	13 30	14 0	14 15	14 48	15 18	15 48	16 21	16 54	17 22	18 0	18 10
14	7 45	8 10	8 45	9 20	9 55	10 30	11 5	11 30	12 5	12 30	13 5	14 0	14 1	14 30	15 0	15 15	15 48	16 18	16 48	17 21	17 54	18 22	19 0	19 10
15	8 7	8 45	9 22	10 0	10 37	11 15	11 53	12 30	13 7	14 0	14 35	15 0	15 1	15 30	16 0	16 15	16 48	17 18	17 48	18 21	18 54	19 22	20 0	20 10
16	8 40	9 20	10 0	10 40	11 20	12 0	12 40	13 20	14 0	14 40	15 20	16 0	16 1	16 30	17 0	17 15	17 48	18 18	18 48	19 21	19 54	20 22	21 0	21 10
17	9 12	9 55	10 37	11 20	12 0	12 45	13 28	14 15	15 0	15 45	16 28	17 0	17 1	17 30	18 0	18 15	18 48	19 18	19 48	20 21	20 54	21 22	22 0	22 10
18	9 45	10 30	11 15	12 0	12 45	13 30	14 15	15 0	15 45	16 30	17 15	18 0	18 1	18 30	19 0	19 15	19 48	20 18	20 48	21 21	21 54	22 22	23 0	23 10
19	10 17	11 5	11 52	12 40	13 28	14 15	15 0	15 45	16 30	17 15	18 0	19 0	19 1	19 30	20 0	20 15	20 48	21 18	21 48	22 21	22 54	23 22	24 0	24 10
20	10 50	11 40	12 30	13 20	14 10	15 0	15 50	16 40	17 30	18 20	19 10	20 0	20 1	20 30	21 0	21 15	21 48	22 18	22 48	23 21	23 54	24 22	25 0	25 10
21	11 22	12 15	13 7	14 0	14 53	15 45	16 38	17 30	18 23	19 15	20 0	21 0	21 1	21 30	22 0	22 15	22 48	23 18	23 48	24 21	24 54	25 22	26 0	26 10
22	11 55	12 50	13 45	14 40	15 35	16 30	17 25	18 20	19 15	20 10	21 0	22 0	22 1	22 30	23 0	23 15	23 48	24 18	24 48	25 21	25 54	26 22	27 0	27 10
23	12 27	13 25	14 22	15 20	16 18	17 15	18 13	19 10	20 8	21 5	22 5	23 5	24 6	25 5	26 5	27 5	28 18	28 48	29 21	29 54	30 22	30 55	31 0	31 10
24	13 0	14 0	15 0	16 0	17 0	18 0	19 0	20 0	21 0	22 0	23 0	24 0	25 0	26 0	27 0	28 0	29 0	30 0	31 0	32 0	33 0	34 0	35 0	36 0
	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.

*THE TABLES OF THE VARIATION OF THE SUN'S
DECLINATION.*

THE use of the foregoing Tables is to regulate the difference of the Sun's declination at noon at London, and any other hour E. or W. of it.

The declination being calculated for the time the sun is on the meridian at London, it is necessary to account for the difference of declination according to the difference of time, if neglected; and, particularly, when the sun is near the equator or equinoctial, it will make a considerable error in working for the latitude by a meridian altitude, and much more when the latitude is to be determined by a single altitude before or after noon.

Noon in 15 miles east longitude, is one minute before noon at London; in 15 degrees, is one hour; 30 degrees, two hours, and so in proportion to 180 degrees: there it is 12 hours before noon at London, as noon in that longitude is midnight at London; which is gaining four minutes of time for each degree, failing eastward, and one hour for every 15 degrees.

Noon in 15 miles west longitude, is one minute after noon at London; 15 degrees, is one hour; 30 degrees, is two hours, and so in proportion to 180 degrees: there it is 12 hours after noon at London, which is midnight at London, which is losing four minutes of time for each degree, failing westward, and one hour for every 15 degrees.

The method of keeping the Log-book at sea.—The day begins after the last noon, and is marked P.M. to midnight, and A.M. from midnight to the noon of the day entered into, for which noon the declination is to be taken, to work for the latitude either with the meridian altitude, or the altitude taken at any other hour or minute before or after noon.

The greatest variation of the sun's declination, is no more than one minute in one hour; and as 15 degrees difference of longitude, is equal to one hour of time, it is needless to make the tables for each degree, as it would add greatly to the expence of printing, &c.

At the head of the first table, which sheweth the difference of declination from noon at London, and noon in any longitude east or west of London, is the degrees of longitude east or west for each hour from noon to midnight, under which is M. for minutes, and S. for seconds; in the first column on the left hand is the daily difference.

In the columns under M.S. is the minutes and seconds each 15 degrees of longitude at noon differs in declination from the declination at noon at London.

At

At the head of the table of hourly variation of the sun's declination, is the hours from the last noon to the noon of the day entered into; 24 hours on the right hand, is the last noon; 1 towards the left is 1 P.M. 2 is 2 P.M. and so on to 12, which is midnight; from midnight 1 on the left hand, is 1 A.M. 2 is 2 A.M. and so on to the noon or the meridian of that day; on the left and right hand columns, is the daily variation of the Sun's declination, from one to 24 minutes. In the other columns is the hourly proportion of that of the daily difference of declination, over which is M. for minutes, and S. for seconds; and under, is A.M. for morning; and P.M. for afternoon, as pr. log; 1 P.M. is the first hour of the day entered into, 2 is the 2d, and 1 A.M. is the 13th, and so on to the meridian of that day, from which the hourly difference of declination is wrought; if the daily difference is increafing, fubtract the difference from the declination of the approaching noon; if decreafing, add the hourly difference.

The first table for hourly variation is for the meridian of London; the second, for 15 degrees east or west longitude; the third for 30 degrees, and so on to 180 degrees; and are calculated from the meridian of London, at noon.

At the head of the first table, is the degree of longitude beginning at 15 degrees, under which, is M. for minutes and S. for seconds, over the minutes and seconds of hourly variation, corresponding with the daily variation which is placed in the right or left hand columns of the table; the second table is for 30 degrees, in like manner, and so on to 180 degrees.

TO FIND THE DAILY VARIATION.

Look out the declination at the last noon, and the declination at the approaching noon, then fubtract the one from the other, the remainder is the daily difference or variation.

If the declination of the last noon be less than the declination of the approaching noon, then it is increafing, but if more, it is decreafing.

If increafing and in east longitude, fubtract from the declination at noon for the given day, but if decreafing, add.

If increafing and in west longitude, add to the declination at noon of the given day; if decreafing, fubtract.

Example I.	On the 1st of Jan. 1793, the declination was	D. M. S.	
		22 57 0	South;
	And on the 2d it was	22 52 0	

The remainder is the daily difference,	0 5 0	decreafing.
--	-------	-------------

Example II.

Example II. On the 2d of April 1793, the declination was

D.	M.	S.
5	13	0

 North.
And on the 1st. it was

4	50	0
---	----	---

0	23	0
---	----	---

 increase.

Example III. On the 20th of June 1793, the declination was

D.	M.	S.
23	28	0

On the 21st. it was

23	28	0
----	----	---

0	0	0
---	---	---

No daily difference

FOR THE DECLINATION FROM NOON AT LONDON.

Example I. On the 2d of January, 1793, the daily difference being 5 minutes decreasing, what is the declination at noon, in longitude 75 east ?

In the table for the variation of the declination at noon, against 5 daily difference, and under 75 degrees, is 1 minute 3 seconds, the difference between noon at London and noon in 75 degrees, east.

To the declination at noon at London	-	-	D.	M.	S.
			22	52	0
Add the variation at 75 degrees, being decreasing	-	-	0	1	3
The declination at 75 degrees, east	-	-	22	53	3

Example II. On the same day, what is the declination at noon, in long. 75 degrees west of London ?

			D.	M.	S.
Subtract from the declination at noon at London	-	-	22	52	0
The variation as above, being decreasing	-	-	0	1	3
The declination at noon in 75 degrees, west longitude			22	50	57

Example III. On the 2d of January, 1793, the daily difference being 5 decreasing, what is the declination at 8 A.M. in the meridian of London ?

In the table of hourly variation for the meridian of London against 5 daily difference, and under 8 A.M. is 50 seconds.

			D.	M.	S.
The hourly variation from noon at London, for the day entered in, add to the declination at noon at London,			22	52	0
The hourly variation being decreasing	-	-	0	0	50
The declination at 8 A.M. in the meridian of London			22	52	50

Example IV.

Example IV. On the same day, what is the declination at 4 P.M. in the meridian of London?

In the table as above, against 5 daily difference, and under 4 P.M. is 4 minutes 4 seconds, the hourly variation from noon at London for the day entered in.

	D.	M.	S.
To the declination at noon at London, for the day entered in	22	52	0
Add the hourly variation, being decreasing	0	4	10
The declination at 4 P.M. in the meridian of London	22	56	10

Example V. On the 2d of January, 1793, the daily difference being 5 decreasing, what is the declination at 8 A.M. in longitude 75 degrees, east of London?

In the table of hourly variation for 75 degrees, against 5 daily difference, and under 8 A.M. is 1 minute 52 seconds, the hourly variation in longitude 75 degrees, east from noon at London.

	D.	M.	S.
To the declination at noon at London	22	52	0
Add the hourly variation, being decreasing	0	1	52
The declination at 8 A.M. in long. 75 deg. east of London	22	53	52

Example VI. On the same day, what is the declination at 4 P.M. in longitude 75 degrees, east of London?

In the table for 75 degrees, against 5 daily difference, and under 4 P.M. is 5 minutes 15 seconds, the hourly variation in longitude 75, east from noon at London.

	D.	M.	S.
To the declination at noon at London for the day entered in	22	52	0
Add the hourly variation, being decreasing	0	5	15
The declination at 4 P.M. in longitude 75, east of London	22	57	15

Example VII. On the same day, what is the declination at 8 A.M. in longitude 75, west of London?

In the table for 75 degrees, against 5 daily difference, and under 8 A.M. is 1 minute 52 seconds, the hourly variation in 75, west from noon at London.

	D.	M.	S.
From the declination at noon at London for the day entered in	22	52	0
Subtract the hourly variation, being decreasing	0	1	52
The declination at 8 A.M. in longitude 75, west of London	22	50	8

Example VIII. On the same day, what is the declination at 4 P.M. in longitude 75, west of London?

In the table for 75 degrees, against 5 daily difference, and under 4 P.M. is 5 minutes 15 seconds, the hourly variation in 75, west from noon at London.

	D.	M.	S.
From the declination at noon at London for the day			
entered in - - - - -	22	52	0
Subtract the hourly variation, being decreasing	0	5	15
The declination at 4 P.M. in long. 75, west of London	22	46	45

Example IX. On the 2d of April 1793, the daily difference being 23 minutes increasing, what is the declination at noon in 75 degrees, east longitude?

In the table for 75 degrees, against 23 daily difference, is 4 minutes 47 seconds, the difference between noon at London and noon in 75 east.

	D.	M.	S.
From the declination at noon at London -	5	13	0
Subtract the variation of the two noons -	0	4	47
The declination at noon in longitude 75 west -	5	8	13

Example X. On the same day, what is the declination at noon in 75 degrees west longitude?

	D.	M.	S.
To the declination at noon at London - -	5	13	0
Add the variation of the two noons - -	0	4	47
The declination at noon in 75 degrees, west longitude	5	17	47

Example XI. On the same day, what is the declination at 8 A.M. in the meridian of London?

In the table for the meridian of London, against 23 daily difference, and under 8 A.M. is 3 minutes 50 seconds, the hourly variation in the meridian of London.

	D.	M.	S.
From the declination at noon - - -	5	13	0
Subtract the hourly variation, being increasing -	0	3	50
The declination at 8 A.M. in the meridian of London	5	9	10

Example XII.

Example XII. On the same day, what is the declination at 4 P.M. in the meridian of London?

In the table for the meridian of London, against 23 daily difference, and under 4 P.M. is 19 minutes 10 seconds, the hourly variation in the meridian of London.

	D.	M.	S.
From the declination at noon of the day entered in	5	13	0
Subtract the hourly variation, being increafing	0	19	10
The declination at 4 P.M. in the meridian of London	4	53	50

Example XIII. On the same day, what is the declination at 8 A.M. in longitude 75 degrees, east of London?

In the table for 75 degrees, against 23 daily difference, and under 8 A.M. is 8 minutes 37 seconds.

	D.	M.	S.
Subtract from the declination at noon at London for the day entered in	5	13	0
The hourly variation, being increafing	0	8	37

The declination at 8 A.M. in the longitude 75 degrees east 5 4 23

Example XIV. On the same day, what is the declination at 4 P.M. in the longitude 75, east of London?

In the table under 75, against 23 daily difference, and under 4 P.M. is 22 minutes 57 seconds, the hourly variation from noon at London.

	D.	M.	S.
From the declination at noon at London for the day entered in	5	13	0
Subtract the hourly variation, being increafing	0	22	57

The declination at 4 P.M. in long. 75, east of London 4 50 3

Example XV. On the same day, what is the declination at 8 A.M. in longitude 75 degrees, west of London?

In the table under 75 degrees, against 23 daily difference, and under 8 A.M. is 8 minutes 37 seconds, the hourly variation from noon at London.

	D.	M.	S.
To the declination at noon at London for the day entered in	5	13	0
Add the hourly variation, being increafing	0	8	37

The declination at 8 A.M. in longitude 75, west of London 5 21 37

Example XVI.

Example XVI. On the same day, what is the declination at 4 P.M. in longitude 75 degrees, west of London?

In the table under 75 degrees, against 23 daily difference, and under 4 P.M. is 22 minutes 57 seconds, the hourly variation from noon at London.

	D.	M.	S.
To the declination at noon at London, for the day entered in	5	13	0
Add the hourly variation, being increasing	0	22	57

The declination at 4 P.M. in longitude 75, west of London 5 35 57

THE Declination being calculated for the Meridian of London, to give at one view how necessary it is to be particular in the variation, the produce of the foregoing examples as stated hereunder, sheweth:

	Declination at Noon.	Declination at 8 A.M.	Declination at 4 P.M.
DECLINATION DECREASING.			
In the meridian of London, the 2d of Jan. 1793,	22 52 0	22 52 50	22 56 10
In the long. 75 east, on the same day, -	22 53 3	22 53 52	22 57 15
In the long. 75 west, on the same day, -	22 50 57	22 50 8	22 46 45
DECLINATION INCREASING.			
In the meridian of London, the 2d of April, 1793,	5 13 0	5 9 10	4 53 50
In the long. 75 east, on the same day, -	5 8 13	5 4 23	4 50 3
In the long. 75 west, on the same day, -	5 17 47	5 21 37	5 35 57

THE DECLINATION DECREASING.

In the meridian of London the declination is more before noon, than at noon; but if increasing, it is less.

In 75, east longitude, it is more before noon; increasing, it is less.

In 75, west longitude, it is less before noon; increasing, it is more.

As the tables are only calculated for every 15 degrees of longitude, or an hour of time, on account of the daily difference never exceeding 1 minute in one hour; and it being no navigator's place to trust to a mile in latitude, without a good look-out when expecting to make the land, I rest satisfied it will give the needful satisfaction

to

to find the declination for determining the latitude. But if required to a greater nicety, see the following examples :

Example I. On the 2d of January 1793, what is the declination at noon in the longitude 70 degrees, east of London, the variation being 5 decreafing?

First, find the variation of the fun's declination for 75 degrees, being the next in the table of variation of the fun's declination above 70 degrees at noon, and you will find againft 5 daily difference, and under 75 degrees, 1 minute 3 seconds, the variation of the fun's declination in longitude 75 degrees ;

Then by the Rule of Three :

If 75 degrees give 1 minute 3 seconds, what will 70 degrees give ?

			M. s.	
Multiply the hourly variation in 75 deg.			1 3	
to bring it into seconds, by	-	-	60	
The seconds	-	-	63	
Multiply by	-	-	70	
Divide by	-	-	75	4410 (58 which is nearest 59 sec.
			375	the variation of the fun's
				declination in 70 deg. at
			660	noon.
			600	
			60	

		D. M. s.
To the declination at noon at London	-	22 52 0
Add the variation at noon in 70 degrees, east, being decreafing		0 0 59
The declination at noon in longitude 70, east	-	22 52 59

On the fame day the variation being 59 seconds in longitude 70, what is the declination in longitude 70, west ?

		D. M. s.
From the declination at noon at London	-	22 52 0
Subtract the variation, being decreafing	-	0 0 59
The declination at noon in longitude 70 degrees, west		22 51 1

Example III. On the 2d of April, 1793, what is the declination at noon in 70 degrees east of London, the daily difference being 23 minutes?

First, find the variation of the sun's declination at noon for 75 degrees in the table of variation of the sun's declination at noon, against 23 daily difference, and under 75, is 4 minutes 47 seconds;

Then by the Rule of Three:

If 75 degrees give 4 minutes 47 seconds, what will 70 degrees give?

					M.	S.	
Multiply the variation at noon in 75 deg.					4	47	
to bring it into seconds, by	-	-	-		60		
The Seconds	-	-	-		287		
Multiply by	-	-	-		70 deg.		
Divide by	-	-	-	75	20090	(⁶⁰) M. S.	
					150	267	4 28 the variation of the
							sun's declination in
					509	240	70 deg. east at noon.
					450	27	
					590		
					525		
					65		

		D.	M.	S.
From the declination at noon at London	-	22	52	0
Subtract the variation, being increafing	-	0	4	28
The declination at noon in longitude 70, east	-	22	47	32

Example IV. On the same day the variation being 4 minutes 28 seconds in longitude 70, what is the declination in longitude 70, west?

		D.	M.	S.
To the declination at noon at London	-	22	52	0
Add the variation, being decreafing	-	0	4	28
The declination at noon in longitude 70, west		22	56	28

In the same manner proceed for any other longitude, working from the next longitude in the tables, exceeding the longitude the declination is required for; and if it is required for any other hour than noon, in place of taking the variation of the declination at noon in 75, if it is the next above the longitude the declination is required for, take it at the hour for which it is required.

Example V.

Example V. On the 2d of April, 1793, what is the declination at 8 A.M. in longitude 70 degrees east, the daily difference being 23 increafing?

In the table of hourly variation for 75 degrees againft 23 daily difference, under 4 hours from noon, which is 8 A.M. is 8 minutes 37 feconds, the hourly variation in longitude 75, east from London.

For the hourly variation in 70, east longitude:

If 75 degrees give 8 minutes 37 feconds, what will 70 degrees give?

	M.	S.	
Multiply the variation at 8 A.M. in 75 degrees,	8	37	
to bring it into feconds, by	-	60	
		<u>517</u>	
Multiply it by	-	70	degrees.
Divide by	-	75	

36190	(482	(8 minutes, the hourly variation at 8 A.M. in long. 70, east.
<u>300</u>	<u>480</u>	
619	2	
<u>600</u>		
190		
150		
<u>40</u>		

	D.	M.	S.
From the declination at noon at London	-	5	57
Subtract the variation, being increafing	-	0	8
		<u>0</u>	<u>0</u>

The declination at 8 A.M. in longitude 70, east	5	49	0
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On the fame day, what is the declination in longitude 70, west, the variation being 8 minutes, increafing.

	D.	M.	S.
To the declination at noon at London	-	5	57
Add the variation, being increafing	-	0	8
		<u>0</u>	<u>0</u>

The declination at 8 A.M. in longitude 70, west	6	5	0
---	---	---	---

If the declination is required for odd minutes, fee the following examples:

Example I. On the 2d of January, 1793, what is the declination at 20 minutes after 8 A.M. in the meridian of London, the daily difference being 5 decreafing?

The hourly variation at 8 A.M. is - 50 feconds.

The hourly variation at 9 A.M. is - 37 feconds.

The difference between 8 A.M. and 9 A.M. is 13 feconds;

Then

Then by the Rule of Three :

If one hour or 60 minutes give 15 difference, what will 20 minutes give ?

Multiply by

Divide by

$$\begin{array}{r} 20 \\ 60 \overline{) 300} \end{array} \left(\begin{array}{l} 5 \text{ seconds ; the proportion of 20 minutes} \\ \text{after 8 A.M.} \end{array} \right.$$

From the hourly variation at 8 A.M. which is

Subtract the proportion of 20 minutes which is

The hourly variation at 20 minutes past 8 in the meridian of London

To the declination at noon at London

Add the hourly variation, being decreasing

The declination at 20 minutes past 8 A.M.

Work in the same manner for any other number of odd minutes when required in any other meridian.

Example I. On the 2d of January, 1793, the daily difference being 5 minutes decreasing, what is the declination at 20 minutes after 8 A.M. in longitude 75, east of London ?

In the table for 75 degrees, against 5 daily difference, and under 4 from noon, which is 8 A.M. is 1 minute 52 seconds.

In the table for 60 degrees, against 5 daily difference, and under 3 from noon, which is 9 A.M. is 1 minute 28 seconds.

From the hourly difference at 8 A.M. in 75 degrees

Subtract the hourly difference at 9 A.M. in 60 degrees

The difference of 15 deg. of long. when the daily difference is 5, and between which is 20 min. past 8 A.M. in 70 deg. of longitude

To find the proportion for 70 degrees, 70 being 5 less than 75 degrees.

If 15 give 24 what will 5 give ?

Multiply by

Divide by

$$\begin{array}{r} 5 \\ 15 \overline{) 120} \end{array} \left(\begin{array}{l} 8 \text{ seconds.} \\ 120 \\ \hline 000 \end{array} \right.$$

From

							M.	S.
From the daily difference in 75 degrees	-						1	52
Subtract	-	-	-	-	-	-	0	8

The hourly difference at 20 minutes past 8 A.M. in longitude 74, east 1 44

							D.	M.	S.
To the declination at noon at London	-						22	52	0
Add the variation 20 minutes past 8, being decreasing							0	1	46

The declination at 20 min. past 8 A.M. in lon. 70, east from London 22 53 46

Example II. On the same day what is the declination at 20 minutes after 8 A.M. in longitude 70, west from London, the hourly difference being 1 minute 44 seconds?

							D.	M.	S.
From the declination at noon at London	-						22	52	0
Subtract the hourly variation, being decreasing	-						0	1	44
							22	50	16

The declination at 20 minutes past 8 A.M. in longitude 70, west from London.

FROM NOON TO MIDNIGHT.

M	N	oon	1 Hour	2 Hours	3 Hours	4 Hours	5 Hours	6 Hours	7 Hours	8 Hours	9 Hours	10 Hours	11 Hours	M
0	0	000000	9992538	9969888	9931230	9875062	9798934	9698970	9568894	9397940	9165680	8825992	8231396	60
1	0	9999999	9992285	9969378	9930443	9873965	9797376	9697071	9566419	9394650	9161091	8818889	8218832	59
2	0	9999992	9992030	9968864	9929652	9872862	9796012	9695164	9563932	9391342	9156462	8811724	8202112	58
3	0	9999981	9991772	9968344	9928854	9871754	9794542	9693248	9561435	9388018	9151826	8804494	8187084	57
4	0	9999966	9991506	9967820	9928052	9870640	9793064	9691324	9558926	9384678	9147150	8797200	8171784	56
5	0	9999949	9991237	9967293	9927246	9869521	9791581	9689391	9556406	9381320	9142446	8789839	8156214	55
6	0	9999926	9990964	9966760	9926434	9868398	9790090	9687450	9553874	9377944	9137710	8782412	8140352	54
7	0	9999898	9990687	9966224	9925617	9867267	9788592	9685500	9551303	9374552	9132946	8774916	8124190	53
8	0	9999868	9990406	9965684	9924796	9866132	9787088	9683542	9548776	9371142	9128140	8767350	8107718	52
9	0	9999832	9990121	9965138	9923969	9864990	9785577	9681576	9546208	9367715	9123325	8759714	8090921	51
10	0	9999794	9989832	9964588	9923138	9863842	9784060	9679600	9543630	9364270	9118468	8752006	8073792	50
11	0	9999749	9989528	9964033	9922302	9862689	9782536	9677617	9541039	9360797	9113579	8744225	8050311	49
12	0	9999702	9989240	9963474	9921460	9861532	9781006	9675624	9538438	9357326	9108658	8736370	8038470	48
13	0	9999650	9988938	9962910	9920614	9860368	9779477	9673623	9535723	9353826	9103705	8728442	8020247	47
14	0	9999594	9988632	9962342	9919764	9859198	9777922	9671614	9532196	9350310	9098720	8720430	8001632	46
15	0	9999534	9988321	9961770	9918907	9858022	9776370	9669595	9530558	9346773	9093702	8712344	7982603	45
16	0	9999470	9988006	9961192	9918046	9856840	9774912	9667556	9527908	9343218	9088650	8704176	7963146	44
17	0	9999403	9987686	9960611	9917180	9855654	9773247	9665530	9525246	9340645	9083566	8695927	7943236	43
18	0	9999330	9987362	9960024	9916308	9854462	9771674	9663484	9522570	9336040	9078446	8687594	7922858	42
19	0	9999253	9987034	9959434	9915433	9853262	9770094	9661430	9519882	9332441	9073292	8679177	7901983	41
20	0	9999174	9986704	9958838	9914552	9852058	9768508	9659366	9517182	9328812	9068104	8670674	7880592	40
21	0	9999088	9986367	9958240	9913665	9850849	9766914	9657294	9514470	9325162	9062879	8662083	7858655	39
22	0	9999000	9986026	9957634	9912774	9849632	9765314	9655212	9511744	9321492	9057620	8653400	7836146	38
23	0	9998906	9985681	9957026	9911878	9848410	9763706	9653122	9509007	9317803	9052323	8644646	7813033	37
24	0	9998808	9985332	9956412	9910976	9847182	9762090	9651022	9506256	9314094	9046990	8635758	7789286	36
25	0	9998707	9984979	9955796	9910070	9845949	9760469	9648913	9503492	9310364	9041621	8626795	7764865	35
26	0	9998602	9984622	9955172	9909158	9844710	9758840	9646794	9500716	9306614	9036214	8617734	7739736	34
27	0	9998492	9984259	9954544	9908242	9843465	9757203	9644666	9497926	9302846	9030768	8608572	7713850	33
28	0	9998378	9983894	9953914	9907320	9842214	9755566	9642530	9495124	9299054	9025284	8599310	7685168	32
29	0	9998260	9983523	9953277	9906394	9840956	9753909	9640383	9492304	9295245	9019561	8589944	7659633	31
30	0	9998138	9983148	9952636	9905462	9839692	9752250	9638226	9489478	9291412	9014198	8580472	7631196	30
31	0	9998012	9982769	9951991	9904525	9838423	9750585	9636061	9486636	9287558	9008595	8570890	7601789	29
32	0	9997882	9982386	9951340	9903582	9837148	9748912	9633886	9483778	9283684	9002952	8561198	7571350	28
33	0	9997747	9981998	9950686	9902635	9835867	9747232	9631701	9480910	9279789	8997264	8551391	7537797	27
34	0	9997608	9981606	9950026	9901682	9834580	9745544	9629506	9478026	9275870	8991542	8541470	7507156	26
35	0	9997465	9981209	9949362	9900724	9833286	9743849	9627303	9475128	9271930	8985577	8530428	7473021	25
36	0	9997318	9980808	9948694	9899762	9831988	9742146	9625088	9472219	9267968	8979964	8521266	7437600	24
37	0	9997157	9980403	9948019	9898793	9830682	9740337	9622865	9469292	9263985	8974110	8510978	7400662	23
38	0	9997012	9979994	9947342	9897820	9829370	9738720	9620632	9466354	9259918	8968214	8500564	7362086	22
39	0	9996851	9979581	9946659	9896841	9828052	9736995	9618388	9463400	9255950	8962271	8480019	7321715	21
40	0	9996688	9979162	9945972	9895858	9826728	9735262	9616136	9460432	9251896	8956284	8479340	7279360	20
41	0	9996521	9978740	9945280	9894868	9825399	9733522	9613871	9457451	9247821	8950250	8468524	7224828	19
42	0	9996348	9978314	9944582	9893874	9824062	9731774	9611598	9454456	9243722	8945172	8457568	7187896	18
43	0	9996172	9977883	9943881	9892875	9822720	9730018	9609315	9451445	9239600	8938044	8446467	7138294	17
44	0	9995992	9977448	9943176	9891870	9821372	9728254	9607020	9448420	9235454	8931860	8435218	7095738	16
45	0	9995807	9977008	9942464	9890860	9820017	9726484	9604717	9445379	9231283	8925648	8423817	7029593	15
46	0	9995618	9976564	9941748	9889844	9818656	9724706	9602402	9442324	9227090	8919376	8412262	6969696	14
47	0	9995425	9976116	9941028	9888823	9817289	9722919	9600079	9439255	9222860	8913055	8400545	6905333	13
48	0	9995228	9975662	9940304	9887796	9815916	9721124	9597744	9436170	9218626	8906884	8388664	6835838	12
49	0	9995028	9975206	9939573	9886765	9814536	9719322	9595398	9433011	9214357	8900250	8376615	6760251	11
50	0	9994822	9974744	9938840	9885728	9813148	9717512	9593042	9429956	9210064	8893786	8364392	6677506	10
51	0	9994462	9974279	9938100	9884686	9811757	9715694	9590676	9420827	9205745	8887257	8351989	6585980	9
52	0	9994398	9973808	9937356	9883638	9810358	9713868	9588300	9423678	9201400	8870676	8339404	6483710	8
53	0	9994181	9973334	9936606	9882586	9808952	9712034	9585911	9420517	9197068	8874040	8326628	6366698	7
54	0	9993958	9972854	9935854	9881526	9807540	9710192	9583514	9417340	9192630	8867350	8313660	6233852	6
55	0	9993732	9972371	9935095	9880463	9806122	9708342	9581103	9414147	9188206	8860302	8300477	6073420	5
56	0	9993502	9971884	9934332	9879394	9804698	9706484	9578684	9410938	9183756	8853798	8287110	5881684	4
57	0	9993266	9971391	9933563	9878318	9803266	9704618	9576253	9407703	9179278	8846936	8273509	5631597	3
58	0	9993028	9970894	9932790	9877238	9801828	9702744	9573812	9404472	9175760	8840004	8259708	5279632	2
59	0	9992784	9970393	9932014	9876153	9800384	9700860	9571358	9401214	9170240	8833034	8245658	4673640	1
60	0	9992538	9969888	9931230	9875062	9798934	9698970	9568894	9397940	9165680	8825992	8231396	Midn	0
			11 Hours	10 Hours	9 Hours	8 Hours	7 Hours	6 Hours	5 Hours	4 Hours	3 Hours	2 Hours	1 Hour	

FROM MIDNIGHT TO NOON,

o DEGREES.				I DEGREE.				II DEGREES.				III DEGREES.			
I.	II.	No. III.	No. IV.	I.	II.	No. III.	IV.	I.	II.	No. III.	IV.	I.	II.	No. III.	IV.
0	0	0000000		66	2	8241855	3649	265	3	8442819	1816	596	7	8718800	1208
1	0	6463726	3231863	68	2	8249033	3589	269	4	8446422	1801	602	6	8721204	1202
2	0	6764756	150515	71	3	8256094	3530	273	4	8449995	1786	609	7	8723595	1195
3	0	6940847	88045	73	2	8263042	3474	278	5	8453539	1772	616	6	8725972	1188
4	0	7065786	62469	75	2	8269881	3419	283	5	8457054	1757	622	6	8728337	1182
5	0	7162696	48455	78	3	8276614	3366	287	4	8460540	1743	629	7	8730688	1175
6	0	7241877	39590	80	2	8283243	3314	292	5	8463999	1729	636	7	8733027	1169
7	0	7308824	33473	83	3	8289773	3265	296	4	8467431	1716	643	7	8735353	1163
8	0	7366816	28996	85	2	8296207	3217	301	5	8470836	1702	650	7	8737668	1157
9	0	7417968	25576	88	3	8302546	3169	306	5	8474214	1689	657	7	8739969	1150
10	1	7463725	22878	90	2	8308794	3124	311	5	8477566	1676	664	7	8742259	1145
11	2	7505118	20696	93	3	8314954	3080	315	4	8480892	1663	671	7	8744536	1138
12	3	7542907	18894	95	2	8321027	3036	320	5	8484193	1650	678	7	8746802	1133
13	3	7577668	17380	98	3	8327016	2994	325	5	8487469	1638	685	7	8749055	1126
14	4	7609853	16092	101	3	8332924	2954	330	5	8490721	1626	692	7	8751297	1121
15	4	7639186	14981	103	2	8338753	2914	335	5	8493948	1613	699	7	8753528	1115
16	5	7667844	14018	106	3	8344504	2875	340	5	8497152	1602	706	7	8755747	1119
17	5	7694173	13174	109	3	8350180	2838	345	5	8600332	1590	714	8	8757955	1104
18	6	7718997	12412	112	3	8355783	2801	350	5	8603489	1578	721	7	8759955	1098
19	7	7742478	11740	115	3	8361315	2766	355	5	8606623	1567	728	7	8760151	1093
20	7	7764754	11138	118	3	8366777	2731	360	5	8609734	1555	735	8	8762337	1087
21	8	7785943	10594	121	3	8372171	2697	365	5	8612823	1544	743	7	8764511	1082
22	9	7806146	10101	124	3	8377499	2664	371	6	8615891	1534	750	8	8766675	1076
23	10	7825451	9652	127	3	8382762	2631	376	5	8618937	1523	758	8	8768827	1071
24	11	7843934	9241	130	3	8387962	2600	381	5	8621962	1512	765	8	8770970	1065
25	12	7861662	8864	133	3	8393101	2569	386	5	8624965	1501	773	8	8773101	1061
26	12	7887695	8516	136	3	8398179	2538	392	6	8627948	1491	780	8	8775223	1055
27	13	7895085	8195	139	3	8403199	2510	397	5	8629948	1483	788	8	8777333	1040
28	14	7910879	7897	142	3	8408161	2481	403	5	8630911	1471	795	8	8779434	1045
29	16	7926119	7620	146	3	8413068	2453	408	5	8633854	1461	798	8	8781524	1040
30	17	7940842	7361	149	3	8417919	2425	413	5	8636776	1452	803	8	8783605	1035
31	18	7955082	7120	152	3	8417919	2399	419	6	8639680	1441	811	8	8785675	1030
32	19	7968870	6891	156	3	8422717	2373	425	6	8642563	1432	819	7	8787736	1025
33	20	7982233	6681	159	3	8427462	2347	430	5	8645428	1423	826	8	8789787	1020
34	21	7995198	6482	162	3	8432156	2322	436	6	8648271	1414	834	8	8791828	1015
35	23	8007787	6294	166	4	8436800	2297	442	6	8651102	1404	842	8	8793859	1011
36	24	8020021	6117	169	4	8441394	2273	447	5	8653911	1395	850	8	8795881	1006
37	25	8031919	5949	173	4	8445941	2249	453	6	8656702	1386	858	8	8797894	1001
38	26	8043501	5792	177	3	8450440	2226	459	6	8659475	1377	866	8	8799897	997
39	28	8054781	5638	180	3	8454893	2204	465	6	8662230	1369	874	8	8801892	992
40	29	8065776	5497	184	4	8459301	2182	471	6	8664968	1360	882	8	8803876	988
41	31	8076500	5362	188	4	8463665	2160	476	5	8667689	1352	890	8	8805852	983
42	32	8086965	5232	191	3	8467985	2139	482	6	8670393	1343	898	8	8807819	979
43	34	8097183	5109	195	4	8472263	2117	488	6	8673080	1335	906	8	8809777	974
44	36	8107167	4992	199	4	8476498	2097	494	6	8675751	1327	914	9	8811726	969
45	37	8116926	4879	203	4	8480693	2077	500	6	8678405	1319	923	8	8813667	965
46	39	8126471	4772	207	4	8484848	2057	506	6	8681043	1311	931	8	8815598	961
47	41	8135810	4664	210	3	8488963	2038	513	7	8683665	1304	939	9	8817522	957
48	42	8144953	4571	214	4	8493040	2019	519	6	8686272	1295	948	8	8819436	953
49	44	8153908	4477	218	4	8497078	2001	525	6	8688863	1287	956	8	8821343	948
50	46	8162681	4386	222	4	8501080	1982	531	6	8691438	1280	964	9	8823240	945
51	48	8171280	4299	226	4	8505045	1964	538	7	8693998	1272	973	8	8825130	940
52	50	8179713	4216	231	5	8508974	1946	544	6	8696543	1266	981	9	8827011	936
53	52	8187985	4136	235	4	8512867	1929	550	6	8699073	1266	990	8	8828884	932
54	54	8196102	4058	239	4	8516726	1912	556	6	8701589	1252	998	9	8830749	929
55	56	8204070	3984	243	4	8520551	1896	563	7	8704090	1250	1007	9	8832607	924
56	58	8211895	3912	247	4	8524343	1879	569	6	8706577	1243	1016	9	8834456	920
57	60	8219581	3843	252	5	8528102	1863	576	7	8709049	1236	1024	9	8836297	916
58	62	8227134	3776	256	4	8531828	1848	582	6	8711508	1229	1033	9	8838130	913
59	64	8234557	3711	260	4	8535523	1831	589	7	8713952	1222	1042	8	8839956	909
			3649	260	5	8539186	1816			8716383	1215	1050	9	8841774	905

IV. DEGREES.					V. DEGREES.					VI. DEGREES.					VII. DEGREES.				
I.	II.	No. III.	IV.		I.	II.	No. III.	IV.		I.	II.	No. III.	IV.		I.	II.	No. III.	IV.	
0	1059	9	8843585	903	1656	11	8940296	723		2386	13	9019235	602		3249	16	9085894	515	0
1	1068	9	8845387	901	1667	11	8941738	721		2399	13	9020435	600		3265	16	9086922	514	1
2	1077	9	8847183	898	1678	11	8943174	718		2412	13	9021632	598		3280	15	9087947	512	2
3	1086	9	8848971	894	1689	11	8944606	716		2426	14	9022825	596		3296	16	9088970	511	3
4	1095	9	8850751	890	1700	11	8946034	714		2439	13	9024016	595		3312	16	9089990	510	4
5	1104	9	8852524	886	1711	11	8947456	711		2453	14	9025203	593		3327	15	9091008	509	5
6	1113	9	8854291	883	1723	11	8948874	709		2466	13	9026386	591		3343	16	9092024	508	6
7	1122	9	8856049	879	1734	11	8950287	706		2479	14	9027567	590		3359	16	9093037	506	7
8	1131	9	8857801	876	1745	12	8951696	704		2493	14	9028744	588		3375	15	9094047	505	8
9	1140	9	8859546	872	1757	11	8953100	702		2507	13	9029918	586		3390	16	9095056	504	9
10	1149	10	8861283	868	1768	12	8954494	699		2520	14	9031089	585		3406	16	9096062	503	10
11	1159	9	8863014	865	1780	12	8955894	697		2534	14	9032257	584		3422	16	9097065	501	11
12	1168	9	8864738	862	1791	11	8957284	695		2548	13	9033421	582		3438	16	9098066	499	12
13	1177	10	8866455	858	1803	12	8958670	693		2561	14	9034582	580		3454	16	9099065	498	13
14	1187	9	8868165	855	1814	11	8960052	691		2575	14	9035741	579		3460	16	9000062	497	14
15	1196	9	8869868	851	1826	12	8961429	688		2589	14	9036896	577		3476	16	9001056	496	15
16	1205	10	8871565	848	1837	11	8962801	686		2603	14	9038048	576		3502	16	9002048	495	16
17	1215	9	8873255	845	1849	12	8964170	684		2617	14	9039197	574		3518	17	9003037	494	17
18	1224	10	8874938	841	1861	12	8965534	682		2631	14	9040342	572		3535	16	9004025	493	18
19	1234	9	8876615	838	1873	12	8966893	679		2645	14	9041485	571		3551	16	9005010	492	19
20	1243	10	8878285	835	1884	12	8968249	678		2659	14	9042625	570		3567	17	9006002	491	20
21	1253	10	8879949	832	1896	12	8969600	675		2673	14	9043762	568		3583	17	9007000	490	21
22	1263	9	8881607	829	1908	12	8970947	673		2687	14	9044895	566		3600	16	9008000	489	22
23	1272	10	8883258	825	1920	12	8972289	671		2701	14	9046026	564		3616	16	9009000	488	23
24	1282	10	8884903	822	1932	12	8973628	669		2715	14	9047154	563		3632	17	9010000	487	24
25	1292	9	8886542	819	1944	12	8974962	667		2729	14	9048279	562		3649	16	9011000	486	25
26	1301	10	8888187	815	1956	12	8976293	665		2743	15	9049400	560		3665	17	9012000	484	26
27	1311	10	8889801	813	1968	12	8977619	663		2758	14	9050519	559		3682	16	9013000	483	27
28	1321	10	8891421	810	1980	12	8978941	662		2772	14	9051635	558		3698	17	9014000	482	28
29	1331	10	8893035	807	1992	12	8980259	659		2786	14	9052748	556		3715	17	9015000	481	29
30	1341	10	8894643	804	2004	12	8981573	657		2801	15	9053859	555		3731	17	9016000	480	30
31	1351	10	8896245	801	2016	12	8982883	655		2815	14	9054966	553		3748	17	9017000	478	31
32	1361	10	8897842	798	2028	12	8984189	653		2830	15	9056071	552		3765	16	9018000	477	32
33	1371	10	8899432	795	2041	13	8985491	651		2844	14	9057172	550		3782	17	9019000	476	33
34	1381	10	8901017	792	2053	12	8986789	649		2859	15	9058271	549		3798	17	9020000	475	34
35	1391	10	8902596	789	2065	12	8988083	647		2873	14	9059367	548		3815	17	9021000	474	35
36	1401	10	8904169	786	2078	13	8989374	645		2888	15	9060460	546		3832	17	9022000	473	36
37	1411	11	8905736	783	2090	12	8990660	643		2902	14	9061551	545		3849	17	9023000	472	37
38	1422	10	8907297	780	2103	13	8991943	641		2917	15	9062639	544		3866	17	9024000	471	38
39	1432	10	8908854	778	2115	12	8993222	639		2932	15	9063723	542		3883	17	9025000	470	39
40	1442	10	8910404	775	2127	13	8994497	637		2947	14	9064806	541		3900	17	9026000	469	40
41	1452	11	8911940	772	2140	13	8995768	635		2961	15	9065885	539		3917	17	9027000	468	41
42	1463	10	8913488	769	2153	12	8997036	634		2976	15	9066962	538		3934	17	9028000	467	42
43	1473	11	8915022	767	2165	13	8998299	631		2991	15	9068036	537		3951	17	9029000	466	43
44	1484	10	8916550	764	2178	13	8999559	630		3006	15	9069107	535		3968	17	9030000	465	44
45	1494	11	8918073	761	2191	12	9000816	628		3021	15	9070176	534		3985	17	9031000	464	45
46	1505	10	8919591	759	2203	13	9002069	626		3036	15	9071242	533		4002	18	9032000	463	46
47	1515	11	8921103	756	2216	13	9003318	624		3051	15	9072305	532		4020	17	9033000	462	47
48	1526	10	8922611	754	2229	13	9004563	622		3066	15	9073366	531		4037	17	9034000	461	48
49	1536	11	8924112	751	2242	13	9005805	621		3181	15	9074424	529		4054	18	9035000	460	49
50	1547	11	8925609	748	2255	13	9007044	620		3196	15	9075480	528		4072	17	9036000	459	50
51	1558	11	8927100	745	2268	13	9008278	617		3111	15	9076533	526		4089	17	9037000	458	51
52	1569	10	8928587	743	2281	13	9009510	616		3126	16	9077583	525		4106	18	9038000	457	52
53	1579	11	8930068	740	2294	13	9010737	614		3142	15	9078631	524		4124	17	9039000	456	53
54	1590	11	8931544	738	2307	13	9011962	612		3157	15	9079676	522		4141	18	9040000	455	54
55	1601	11	8933015	735	2320	13	9013182	610		3172	16	9080719	521		4159	18	9041000	454	55
56	1612	11	8934481	733	2333	13	9014400	609		3188	15	9081759	520		4177	17	9042000	453	56
57	1623	11	8935942	731	2346	13	9015613	607		3203	15	9082797	518		4194	18	9043000	452	57
58	1634	11	8937398	728	2359	13	9016824	605		3218	16	9083832	517		4212	18	9044000	451	58
59	1645	11	8938850	726	2372	13	9018031	603		3234	15	9084864	516		4230	17	9045000	450	59
				723				602					515					449	59

VIII. DEGREES.				IX. DEGREES.				X. DEGREES.				XI. DEGREES.				
I.	II.	No. III.	IV.	I.	II.	No. III.	IV.	I.	II.	No. III.	IV.	I.	II.	No. III.	IV.	
0	4247	17	9143555	449	5380	20	9194332	398	6648	22	9239670	358	8053	24	9280599	325
1	4265	18	9144453	448	5400	20	9195129	398	6671	23	9240386	358	8078	25	9281248	324
2	4283	18	9145349	447	5420	20	9195925	397	6693	22	9241101	357	8103	25	9281897	324
3	4301	18	9146243	446	5440	20	9196719	396	6716	23	9241814	356	8122	24	9282544	323
4	4319	18	9147136	445	5460	20	9197511	395	6738	22	9242526	356	8152	25	9283190	323
5	4337	18	9148026	444	5481	21	9198302	395	6760	22	9243237	355	8177	25	9283836	323
6	4354	17	9148915	443	5501	20	9199091	394	6783	23	9243947	355	8201	24	9284480	322
7	4372	18	9149801	442	5521	20	9199879	393	6805	22	9244656	354	8226	25	9285124	322
8	4391	18	9150686	441	5541	20	9200666	392	6828	23	9245363	353	8251	25	9285766	321
9	4409	18	9151569	440	5562	21	9201451	392	6851	23	9246069	353	8276	25	9286408	321
10	4427	18	9152451	439	5582	20	9202234	392	6873	22	9246775	353	8301	25	9287048	320
11	4445	18	9153330	438	5603	21	9203017	391	6896	23	9247478	352	8326	25	9287687	319
12	4463	18	9154208	437	5623	20	9203797	390	6919	23	9248181	352	8351	25	9288326	319
13	4481	18	9155083	436	5643	20	9204577	390	6941	22	9248883	351	8376	25	9288964	318
14	4500	19	9155957	436	5664	21	9205354	389	6964	23	9249583	350	8401	25	9289600	318
15	4518	18	9156830	435	5684	20	9206131	388	6987	23	9250282	349	8426	25	9290236	318
16	4536	18	9157700	434	5705	21	9206906	387	7010	23	9250980	348	8451	25	9290870	317
17	4555	19	9158569	433	5726	21	9207679	386	7033	23	9251677	348	8476	25	9291504	316
18	4573	18	9159435	432	5746	20	9208452	386	7056	23	9252373	348	8502	26	9292137	316
19	4591	18	9160300	431	5767	21	9209222	385	7079	23	9253067	347	8527	25	9292768	315
20	4610	19	9161164	430	5788	21	9209990	384	7102	23	9253761	347	8552	25	9293399	315
21	4628	18	9162025	430	5809	20	9210760	383	7125	23	9254453	346	8577	25	9294029	315
22	4647	19	9162885	429	5829	21	9211526	383	7148	23	9255144	345	8603	26	9294658	314
23	4666	19	9163743	428	5850	21	9212291	382	7171	23	9255834	345	8628	25	9295286	314
24	4684	18	9164600	427	5871	21	9213055	381	7194	23	9256523	344	8654	26	9295913	313
25	4703	19	9165454	426	5892	21	9213817	380	7217	23	9257211	344	8679	25	9296539	313
26	4722	19	9166307	425	5913	21	9214578	380	7241	24	9257898	343	8705	26	9297164	312
27	4730	18	9167159	424	5934	20	9215338	380	7264	23	9258583	342	8730	25	9297788	312
28	4759	19	9168008	424	5954	21	9216097	379	7287	23	9259268	342	8756	26	9298412	312
29	4778	19	9168856	423	5976	21	9216854	378	7311	24	9259951	341	8782	26	9299034	311
30	4797	19	9169702	422	5997	22	9217609	377	7334	23	9260633	341	8807	25	9299655	310
31	4816	19	9170546	422	6019	22	9218363	377	7357	23	9261314	340	8833	26	9300276	310
32	4835	19	9171389	421	6040	21	9219116	376	7381	24	9261994	340	8859	26	9300895	309
33	4854	19	9172230	420	6061	21	9219868	376	7404	23	9262673	339	8885	26	9301514	309
34	4873	19	9173070	419	6082	21	9220618	375	7428	24	9263351	338	8910	25	9302132	308
35	4892	19	9173908	418	6104	22	9221367	374	7451	23	9264027	338	8936	26	9302749	308
36	4911	19	9174744	417	6125	21	9222115	373	7475	24	9264703	337	8962	25	9303364	307
37	4930	19	9175578	417	6146	22	9222861	372	7499	23	9265377	337	8988	26	9303979	307
38	4949	19	9176411	416	6168	21	9223606	372	7522	24	9266051	336	9014	26	9304593	307
39	4968	19	9177242	415	6189	21	9224349	371	7546	23	9266723	336	9040	26	9305207	306
40	4987	20	9178072	415	6211	22	9225092	371	7570	24	9267395	336	9066	26	9305819	306
41	5007	20	9178900	414	6232	21	9225833	370	7594	23	9268065	335	9092	26	9306430	305
42	5026	19	9179726	413	6254	22	9226573	370	7618	24	9268734	334	9118	26	9307041	305
43	5045	19	9180551	412	6275	21	9227311	369	7642	23	9269402	334	9145	27	9307650	304
44	5065	20	9181374	411	6297	22	9228048	368	7665	24	9270069	333	9171	26	9308259	304
45	5084	19	9182196	411	6319	21	9228784	368	7689	23	9270735	332	9197	26	9308867	304
46	5104	20	9183016	410	6340	21	9229519	367	7713	24	9271400	332	9223	26	9309474	303
47	5123	19	9183834	409	6362	22	9229519	366	7737	23	9272063	331	9250	27	9300080	303
48	5143	20	9184651	408	6384	22	9230252	366	7762	24	9272726	331	9276	26	9300685	302
49	5162	19	9185466	407	6406	21	9230984	365	7786	23	9273388	331	9303	27	9311289	302
50	5182	20	9186280	407	6428	22	9231715	364	7810	24	9274049	330	9329	26	9311893	302
51	5202	20	9187092	406	6450	22	9232444	364	7834	23	9274708	329	9356	27	9312495	301
52	5221	19	9187903	405	6472	21	9233172	363	7858	24	9275367	329	9382	26	9313097	301
53	5241	20	9188712	404	6493	22	9233899	363	7883	23	9276025	329	9409	27	9313698	299
54	5261	20	9189519	403	6515	21	9234625	362	7907	24	9276682	328	9435	26	9314297	299
55	5281	19	9190325	403	6538	22	9235349	361	7931	23	9277337	327	9462	27	9314896	299
56	5300	20	9191130	402	6560	21	9236072	361	7956	24	9277992	327	9489	26	9315495	299
57	5320	20	9191933	401	6582	22	9236794	360	7980	23	9278645	326	9515	27	9316092	298
58	5340	20	9192734	400	6604	21	9237515	360	8004	24	9279297	326	9542	26	9316688	298
59	5360	20	9193534	398	6626	22	9238235	358	8029	25	9279948	325	9569	27	9317284	297
							9238953	358				325				297

XII. DEGREES.				XIII. DEGREES.				XIV. DEGREES.				XV. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	9596	27	9317879	297	11276	29	9352088	274	13096	32	9383675	253	15056	34	9412996	236
1	9623	27	9318473	297	11305	29	9352635	273	13127	31	9384181	253	15090	34	9413467	235
2	9649	26	9319066	296	11334	29	9353181	272	13159	32	9384687	253	15124	34	9413938	235
3	9676	27	9319658	296	11364	30	9353726	272	13191	32	9385192	252	15158	34	9414408	235
4	9703	27	9320249	295	11393	29	9354271	272	13222	31	9385697	252	15192	34	9414878	235
5	9730	27	9320840	295	11422	29	9354815	272	13254	32	9386201	252	15226	34	9415347	234
6	9757	27	9321430	295	11452	30	9355358	271	13286	32	9386704	251	15260	34	9415815	234
7	9785	28	9322019	294	11481	29	9355901	271	13317	31	9387207	251	15294	34	9416283	234
8	9812	27	9322607	293	11511	30	9356443	271	13349	32	9387709	251	15328	34	9416751	234
9	9839	27	9323194	293	11540	29	9356984	270	13381	32	9388210	250	15363	35	9417217	233
10	9866	27	9323780	293	11570	30	9357524	270	13413	32	9388711	250	15397	34	9417684	233
11	9893	28	9324366	292	11599	29	9358064	269	13445	32	9389211	250	15431	34	9418149	233
12	9921	27	9324951	291	11629	30	9358603	269	13477	32	9389711	249	15465	34	9418615	233
13	9948	27	9325534	291	11658	29	9359141	269	13509	32	9390210	249	15500	35	9419079	232
14	9975	28	9326117	291	11688	30	9359679	268	13541	32	9390708	249	15534	34	9419544	232
15	10003	27	9326700	290	11718	30	9360215	268	13573	32	9391206	248	15568	34	9420007	232
16	10030	28	9327281	290	11748	29	9360751	268	13605	32	9391703	248	15603	35	9420470	231
17	10058	27	9327861	290	11777	30	9361287	267	13637	32	9392199	248	15637	34	9420933	231
18	10085	28	9328442	289	11807	30	9361822	267	13669	32	9392695	247	15672	35	9421395	231
19	10113	27	9329021	289	11837	30	9362356	266	13701	33	9393190	247	15707	35	9421857	230
20	10140	28	9329599	288	11867	30	9362889	266	13734	32	9393685	247	15741	35	9422318	230
21	10168	28	9330176	288	11897	30	9363422	266	13766	32	9394179	247	15776	35	9422778	230
22	10196	27	9330753	287	11927	30	9363954	265	13798	33	9394673	246	15811	35	9423238	230
23	10223	28	9331328	287	11957	30	9364485	265	13831	32	9395166	246	15845	34	9423697	230
24	10251	28	9331903	287	11987	30	9365016	265	13863	33	9395658	246	15880	35	9424156	229
25	10279	28	9332478	286	12017	31	9365546	264	13896	33	9396150	245	15915	35	9424615	229
26	10307	28	9333051	286	12048	30	9366075	264	13928	32	9396641	245	15950	35	9425073	228
27	10335	28	9333624	285	12078	30	9366604	264	13961	33	9397132	245	15985	34	9425530	228
28	10363	28	9334195	285	12108	30	9367132	263	13993	33	9397621	245	16019	35	9425987	228
29	10391	28	9334766	285	12138	31	9367659	263	14026	32	9398111	244	16054	36	9426443	228
30	10419	28	9335337	284	12169	30	9368185	263	14058	33	9398600	244	16090	35	9426899	227
31	10447	28	9335906	284	12199	30	9368711	262	14091	33	9399088	243	16125	35	9427354	227
32	10475	28	9336475	284	12229	31	9369236	262	14124	33	9399575	243	16160	35	9427809	227
33	10503	28	9337043	283	12260	30	9369761	262	14157	32	9400062	243	16195	35	9428263	227
34	10531	28	9337610	283	12290	31	9370285	261	14189	33	9400549	243	16230	35	9428717	226
35	10559	28	9338176	282	12321	30	9370808	261	14222	33	9401035	242	16265	35	9429170	226
36	10587	29	9338742	282	12351	31	9371330	261	14255	33	9401520	242	16300	35	9429623	226
37	10616	28	9339306	282	12382	30	9371852	260	14288	33	9402005	242	16336	36	9430075	226
38	10644	28	9339871	281	12412	31	9372373	260	14321	33	9402489	241	16371	35	9430527	225
39	10672	29	9340434	281	12443	31	9372894	260	14354	33	9402972	241	16406	36	9430978	225
40	10701	28	9340996	280	12474	31	9373414	259	14387	33	9403455	241	16442	35	9431429	225
41	10729	29	9341558	280	12505	30	9373933	259	14420	33	9403938	241	16477	36	9431879	225
42	10757	29	9342119	280	12535	31	9374452	259	14453	34	9404420	240	16513	35	9432328	225
43	10786	28	9342679	280	12566	31	9374970	258	14487	33	9404901	240	16548	36	9432778	224
44	10814	29	9343239	279	12597	31	9375487	258	14520	33	9405382	240	16584	36	9433227	224
45	10843	29	9343797	279	12628	31	9376003	258	14553	33	9405862	239	16610	35	9433675	224
46	10872	28	9344355	278	12659	31	9376519	258	14586	34	9406341	239	16655	36	9434122	223
47	10900	29	9344912	278	12690	31	9377035	257	14620	33	9406820	239	16691	36	9434569	223
48	10929	29	9345469	277	12721	31	9377549	257	14653	33	9407299	239	16727	36	9435016	223
49	10958	28	9346024	277	12752	31	9378063	257	14686	33	9407777	238	16762	35	9435462	223
50	10986	29	9346579	277	12783	31	9378577	256	14720	34	9408254	238	16798	36	9435908	222
51	11015	29	9347134	276	12814	31	9379089	256	14753	33	9408731	238	16834	36	9436353	222
52	11044	29	9347687	276	12845	31	9379602	255	14787	34	9409207	237	16870	36	9436798	222
53	11073	29	9348240	276	12876	32	9380113	255	14820	33	9409682	237	16906	36	9437242	222
54	11102	29	9348792	275	12908	31	9380624	255	14854	34	9410157	237	16942	36	9437686	221
55	11131	29	9349343	275	12939	31	9381134	254	14888	34	9410632	237	16978	36	9438129	221
56	11160	29	9349893	275	12970	32	9381643	254	14921	34	9411106	236	17014	36	9438572	221
57	11189	29	9350443	274	13002	31	9382152	254	14955	34	9411579	236	17050	36	9439014	221
58	11218	29	9350992	274	13033	31	9382660	254	14989	33	9412052	236	17086	36	9439456	220
59	11247	29	9351540	274	13064	32	9383168	253	15022	34	9412524	236	17122	36	9439897	220

XVI. DEGREES.				XVII. DEGREES.				XVIII. DEGREES.				XIX. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	17158	36	9440338	220	19404	39	9465935	206	21794	41	9489982	194	24330	43	9512642	183
1	17195	37	9440778	220	19442	38	9466348	206	21835	41	9490371	194	24374	44	9513009	183
2	17231	36	9441218	220	19481	39	9466761	206	21876	41	9490759	194	24417	43	9513375	183
3	17267	37	9441658	219	19520	39	9467173	205	21917	41	9491147	193	24461	44	9513741	183
4	17304	36	9442096	219	19559	38	9467585	205	21958	41	9491534	193	24504	43	9514107	182
5	17340	36	9442535	219	19597	38	9467996	205	21999	42	9491922	193	24548	44	9514472	182
6	17376	37	9442973	218	19636	39	9468407	205	22041	41	9492308	193	24592	44	9514837	182
7	17413	36	9443410	218	19675	39	9468817	205	22082	41	9492695	193	24635	43	9515202	182
8	17449	37	9443847	218	19714	39	9469227	205	22123	42	9493081	192	24679	44	9515566	182
9	17486	37	9444284	218	19753	39	9469637	204	22165	41	9493466	192	24723	44	9515930	182
10	17523	36	9444720	217	19792	39	9470046	204	22206	42	9493851	192	24767	44	9516294	181
11	17559	37	9445155	217	19831	39	9470455	204	22248	41	9494236	192	24811	44	9516657	181
12	17596	37	9445590	217	19870	39	9470863	204	22289	42	9494620	192	24855	44	9517020	181
13	17633	36	9446025	217	19909	39	9471271	203	22331	41	9495005	191	24899	44	9517382	181
14	17669	37	9446459	217	19948	40	9471678	203	22372	41	9495388	191	24943	44	9517745	181
15	17706	37	9446893	216	19988	39	9472086	203	22414	42	9495772	191	24987	44	9518107	180
16	17743	37	9447326	216	20027	39	9472492	203	22456	42	9496154	191	25031	44	9518468	180
17	17780	37	9447759	216	20066	39	9472898	203	22497	41	9496537	191	25075	45	9518829	180
18	17817	37	9448191	216	20105	39	9473304	202	22539	42	9496919	190	25120	44	9519190	180
19	17854	37	9448623	215	20144	40	9473710	202	22581	42	9497301	190	25164	44	9519551	180
20	17891	37	9449054	215	20184	40	9474115	202	22623	42	9497682	190	25208	45	9519911	180
21	17928	37	9449485	215	20224	39	9474519	202	22665	42	9498063	190	25253	44	9520271	180
22	17965	37	9449915	215	20263	40	9474923	202	22707	42	9498444	190	25297	44	9520631	179
23	18002	37	9450345	215	20303	39	9475327	201	22749	42	9498824	190	25341	45	9520990	179
24	18039	37	9450775	214	20342	40	9475730	201	22791	42	9499204	190	25386	44	9521349	179
25	18076	37	9451204	214	20382	40	9476133	201	22833	42	9499584	189	25430	45	9521707	179
26	18114	38	9451632	214	20422	39	9476536	201	22875	42	9499963	189	25475	44	9522066	178
27	18151	37	9452060	213	20461	40	9476938	201	22917	42	9500342	189	25519	45	9522423	178
28	18188	38	9452488	213	20501	40	9477340	200	22959	42	9500721	189	25564	45	9522781	178
29	18226	37	9452915	213	20541	40	9477741	200	23001	42	9501099	189	25609	45	9523138	178
30	18263	37	9453342	213	20581	39	9478142	200	23043	42	9501476	188	25653	44	9523495	178
31	18301	37	9453768	213	20620	40	9478542	200	23086	43	9501854	188	25698	45	9523852	178
32	18338	37	9454194	213	20669	40	9478942	200	23128	42	9502231	188	25743	45	9524208	178
33	18375	37	9454619	212	20700	40	9479342	199	23170	42	9502607	188	25788	45	9524564	177
34	18413	38	9455044	212	20740	40	9479741	199	23213	43	9502984	188	25833	45	9524920	177
35	18451	37	9455469	212	20780	40	9480140	199	23255	43	9503360	187	25878	45	9525275	177
36	18488	38	9455893	212	20820	40	9480538	199	23298	42	9503735	187	25923	45	9525630	177
37	18526	38	9456316	211	20860	40	9480936	199	23340	43	9504110	187	25968	45	9525984	176
38	18564	38	9456739	211	20900	41	9481334	198	23383	43	9504485	187	26013	45	9526339	176
39	18601	37	9457162	211	20941	40	9481731	198	23426	42	9504860	187	26058	45	9526693	176
40	18639	38	9457584	211	20981	40	9482128	198	23468	43	9505234	186	26103	45	9527046	176
41	18677	38	9458006	210	21021	40	9482525	198	23511	43	9505608	186	26148	45	9527400	176
42	18715	58	9458427	210	21061	41	9482921	197	23554	42	9505981	186	26193	46	9527753	175
43	18753	38	9458848	210	21102	40	9483316	197	23596	43	9506354	186	26239	45	9528105	175
44	18791	38	9459268	210	21142	41	9483712	197	23639	43	9506727	186	26284	45	9528458	175
45	18829	38	9459688	210	21183	40	9484107	197	23682	43	9507099	186	26329	46	9528810	175
46	18867	39	9460108	209	21223	40	9484501	197	23725	43	9507471	185	26375	45	9529161	175
47	18905	38	9460527	209	21263	41	9484895	196	23768	42	9507843	185	26420	45	9529513	175
48	18943	38	9460946	209	21304	41	9485289	196	23810	44	9508214	185	26465	46	9529864	175
49	18981	38	9461364	208	21345	40	9485682	196	23854	43	9508585	185	26511	45	9530215	175
50	19020	58	9461782	208	21385	41	9486075	196	23897	43	9508956	185	26556	46	9530565	175
51	19058	58	9462199	208	21426	41	9486467	195	23940	43	9509326	185	26602	46	9530915	175
52	19096	38	9462616	208	21467	40	9486859	195	23983	43	9509696	184	26648	45	9531265	174
53	19134	38	9463032	208	21507	41	9487251	195	24026	44	9510065	184	26693	46	9531614	174
54	19173	39	9463448	208	21548	41	9487643	195	24070	43	9510434	184	26739	46	9531963	174
55	19211	38	9463864	207	21589	41	9488033	195	24113	43	9510803	184	26785	46	9532312	174
56	19249	38	9464279	207	21620	41	9488424	195	24156	44	9511172	184	26831	45	9532661	174
57	19288	39	9464694	207	21671	41	9488814	195	24200	43	9511540	184	26876	46	9533009	174
58	19327	38	9465108	207	21712	41	9489204	194	24243	44	9511907	183	26922	46	9533357	173
59	19365	39	9465522	206	21753	41	9489593	194	24287	43	9512275	183	26968	46	9533704	173

XX DEGREES.				XXI DEGREES.				XXII DEGREES.				XXIII DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	27014	46	9534052	173	29848	48	9554329	164	32834	51	9573575	156	35974	54	9591878	148
1	27060	46	9534399	173	29897	49	9554658	164	32885	51	9573888	156	36028	54	9592175	148
2	27106	46	9534745	173	29945	48	9554987	164	32936	51	9574200	156	36081	53	9592473	148
3	27152	46	9535092	173	29994	49	9555315	164	32987	51	9574512	156	36135	54	9592770	148
4	27198	46	9535437	173	30043	49	9555643	164	33039	52	9574824	156	36189	54	9593067	148
5	27245	47	9535783	173	30091	48	9555971	164	33090	51	9575136	156	36243	54	9593363	148
6	27291	46	9536129	172	30140	49	9556299	164	33141	51	9575447	155	36296	53	9593659	148
7	27337	46	9536474	172	30189	49	9556626	163	33193	52	9575758	155	36350	54	9593955	148
8	27383	46	9536818	172	30238	49	9556953	163	33244	51	9576068	155	36404	54	9594251	148
9	27430	47	9537163	172	30286	48	9557280	163	33295	51	9576379	155	36458	54	9594547	148
10	27476	46	9537507	172	30335	49	9557606	153	33347	52	9576689	155	36512	54	9594842	147
11	27523	47	9537851	172	30384	49	9557932	163	33398	51	9576999	155	36566	54	9595137	147
12	27569	46	9538194	172	30433	49	9558258	163	33450	52	9577309	155	36621	55	9595432	147
13	27615	46	9538538	171	30482	49	9558583	162	33501	51	9577618	154	36675	54	9595727	147
14	27662	47	9538880	171	30531	49	9558909	162	33553	52	9577927	154	36729	54	9596021	147
15	27709	47	9539223	171	30580	49	9559234	162	33605	52	9578236	154	36783	54	9596315	147
16	27755	46	9539565	171	30630	50	9559558	162	33656	51	9578545	154	36838	55	9596609	147
17	27802	47	9539907	171	30679	49	9559883	162	33708	52	9578854	154	36892	54	9596903	147
18	27849	46	9540249	170	30728	49	9560207	162	33760	52	9579162	154	36946	54	9597196	146
19	27895	47	9540590	170	30777	49	9560531	162	33812	52	9579469	153	37001	55	9597490	146
20	27942	47	9540931	170	30827	50	9560855	162	33863	51	9579777	153	37055	54	9597783	146
21	27989	47	9541272	170	30876	49	9561178	161	33915	52	9580085	153	37110	55	9598075	146
22	28036	47	9541613	170	30925	49	9561501	161	33967	52	9580392	153	37164	54	9598368	146
23	28083	47	9541953	170	30975	50	9561824	161	34019	52	9580699	153	37219	55	9598660	146
24	28130	47	9542293	169	31024	49	9562146	161	34072	53	9581005	153	37273	54	9598952	146
25	28177	47	9542632	169	31074	50	9562468	161	34124	52	9581312	153	37328	55	9599244	145
26	28224	47	9542971	169	31123	49	9562790	161	34176	52	9581618	153	37389	55	9599536	145
27	28271	47	9543310	199	31173	50	9563112	161	34228	52	9581924	153	37438	55	9599827	145
28	28318	47	9543649	169	31223	49	9563434	160	34280	52	9582229	152	37492	54	9600118	145
29	28365	47	9543987	169	31272	49	9563755	160	34332	52	9582535	152	37547	55	9600409	145
30	28412	47	9544325	169	31322	50	9564075	160	34385	53	9582840	152	37602	55	9600700	145
31	28460	48	9544663	168	31372	50	9564396	160	34437	52	9583145	152	37657	55	9600990	145
32	28507	47	9545001	168	31422	50	9564716	160	34489	52	9583449	152	37712	55	9601280	145
33	28554	47	9545338	168	31472	49	9565036	160	34542	53	9583754	152	37767	55	9601570	145
34	28602	48	9545674	168	31521	49	9565356	160	34594	52	9584058	152	37822	55	9601860	145
35	28649	47	9546011	168	31571	50	9565676	159	34647	53	9584361	151	37877	55	9602149	144
36	28697	48	9546347	168	31621	50	9565995	159	34699	52	9584665	151	37933	55	9602439	144
37	28744	47	9546683	168	31672	51	9566314	159	34752	53	9584968	151	37988	55	9602728	144
38	28792	48	9547019	167	31722	50	9566632	159	34805	53	9585272	151	38043	55	9603017	144
39	28839	47	9547354	167	31772	50	9566951	159	34857	53	9585574	151	38098	55	9603305	144
40	28887	48	9547689	167	31822	50	9567269	159	34910	53	9585877	151	38154	56	9603594	144
41	28935	47	9548024	167	31872	50	9567587	159	34963	53	9586180	151	38209	55	9603882	144
42	28982	47	9548358	167	31922	51	9567904	159	35016	53	9586482	151	38265	56	9604170	144
43	29030	48	9548693	167	31973	50	9568222	158	35069	53	9586784	151	38320	55	9604457	143
44	29078	48	9549027	166	32023	50	9568539	158	35121	53	9587085	150	38376	56	9604745	143
45	29126	48	9549360	166	32073	51	9568855	158	35174	53	9587386	150	38431	55	9605032	143
46	29174	48	9549693	166	32124	50	9569172	158	35227	54	9587687	150	38487	56	9605319	143
47	29221	47	9550026	166	32174	51	9569488	158	35281	53	9587988	150	38542	55	9605606	143
48	29269	48	9550359	166	32225	50	9569804	158	35334	53	9588289	150	38598	56	9605892	143
49	29317	48	9550692	166	32275	51	9570120	158	35387	53	9588590	150	38654	55	9606179	143
50	29365	49	9551024	166	32326	51	9570435	157	35440	53	9588890	150	38710	56	9606465	143
51	29414	48	9551356	165	32377	51	9570751	157	35493	54	9589190	150	38765	55	9606751	143
52	29462	48	9551687	165	32429	51	9571066	157	35546	53	9589489	149	38821	56	9607036	142
53	29510	48	9552018	165	32478	51	9571380	157	35600	53	9589789	149	38877	56	9607322	142
54	29558	48	9552349	165	32529	51	9571695	157	35653	53	9590088	149	38933	56	9607607	142
55	29606	48	9552680	165	32580	51	9572009	157	35706	53	9590387	149	38989	56	9607892	142
56	29655	49	9553010	164	32630	50	9572323	157	35760	54	9590686	149	39045	56	9608176	142
57	29703	48	9553341	164	32681	51	9572636	156	35813	53	9590984	149	39101	56	9608461	142
58	29751	48	9553670	164	32732	51	9572949	156	35867	54	9591282	149	39157	56	9608745	142
59	29800	49	9554000	164	32783	51	9573263	156	35920	53	9591580	148	39214	57	9609029	142
		48		164		51		156		54		148		56		142

XXIV DEGREES.				XXV DEGREES.				XXVI DEGREES.				XXVII DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	39270	56	9609313	142	42724	59	9625948	135	46340	62	9641842	129	50119	64	9657047	124
1	39326	56	9609597	141	42783	59	9626219	135	46402	61	9642101	129	50184	65	9657295	124
2	39382	56	9609880	141	42842	59	9626490	135	46463	62	9642360	129	50248	64	9657542	124
3	39438	56	9610163	141	42901	59	9626760	135	46525	62	9642618	129	50312	65	9657790	124
4	39495	57	9610446	141	42960	59	9627030	135	46587	61	9642876	129	50377	65	9658037	123
5	39552	57	9610729	141	43019	59	9627300	135	46648	61	9643135	129	50442	65	9658284	123
6	39608	56	9611012	141	43078	59	9627570	135	46710	62	9643393	129	50506	64	9658531	123
7	39665	57	9611294	141	43138	60	9627840	135	46772	62	9643650	129	50571	65	9658778	123
8	39721	56	9611576	141	43197	59	9628109	134	46834	62	9643908	129	50636	64	9659025	123
9	39778	57	9611858	141	43256	59	9628378	134	46896	62	9644165	129	50700	65	9659271	123
10	39834	56	9612140	140	43316	60	9628647	134	46958	62	9644423	128	50765	64	9659517	123
11	39891	57	9612421	140	43375	59	9628916	134	47020	62	9644680	128	50830	65	9659763	123
12	39948	57	9612702	140	43434	60	9629184	134	47083	63	9644937	128	50895	64	9660009	123
13	40005	57	9612985	140	43494	59	9629453	134	47145	62	9645193	128	50960	65	9660255	123
14	40062	56	9613264	140	43553	60	9629721	134	47207	62	9645450	128	51025	64	9660500	122
15	40118	57	9613545	140	43613	60	9629989	134	47269	62	9645706	128	51090	65	9660746	122
16	40175	57	9613825	140	43673	59	9630257	134	47331	63	9645962	128	51155	64	9660991	122
17	40232	57	9614105	140	43732	60	9630524	134	47394	62	9646218	128	51220	65	9661236	122
18	40289	58	9614385	140	43792	60	9630792	133	47456	63	9646474	128	51285	64	9661481	122
19	40347	57	9614665	139	43852	59	9631059	133	47519	62	9646729	127	51351	65	9661726	122
20	40404	57	9614944	139	43911	60	9631326	133	47581	63	9646984	127	51416	64	9661970	122
21	40461	57	9615223	139	43971	60	9631593	133	47644	62	9647239	127	51481	65	9662214	122
22	40518	57	9615502	139	44031	60	9631859	133	47706	63	9647495	127	51547	64	9662459	122
23	40575	57	9615781	139	44091	60	9632126	133	47769	63	9647749	127	51612	65	9662703	122
24	40632	58	9616060	139	44151	60	9632392	133	47832	62	9648004	127	51677	64	9662946	122
25	40690	57	9616338	139	44211	61	9632658	133	47895	62	9648258	127	51743	65	9663190	121
26	40747	58	9616616	139	44271	60	9632923	133	47957	63	9648512	127	51808	64	9663433	121
27	40805	58	9616894	139	44331	60	9633189	132	48020	63	9648766	127	51874	65	9663677	121
28	40862	57	6617172	139	44391	60	9633454	132	48083	63	9649020	127	51940	64	9663920	121
29	40919	57	9617450	138	44451	60	9633719	132	48146	63	9649274	126	52005	65	9664163	121
30	40977	58	9617727	138	44511	61	9633984	132	48219	62	9649527	126	52071	64	9664406	121
31	41035	57	9618004	138	44572	60	9634249	132	48272	63	9649781	126	52137	65	9664648	121
32	41092	58	9618281	138	44632	60	9634514	132	48335	63	9650034	126	52203	64	9664891	121
33	41150	58	9618558	138	44693	60	9634778	132	48398	63	9650287	126	52269	65	9665133	121
34	41208	58	9618834	138	44753	61	9635042	132	48461	63	9650539	126	52335	64	9665375	121
35	41266	58	9619110	138	44814	60	9635306	132	48524	64	9650792	126	52401	65	9665617	121
36	41323	57	9619386	138	44874	61	9635570	132	48588	63	9651044	126	52467	64	9665859	120
37	41381	58	9619662	138	44935	60	9635833	132	48651	63	9651297	126	52533	65	9666100	120
38	41439	58	9619938	137	44995	60	9636097	131	48714	64	9651549	126	52599	64	9666341	120
39	41497	58	9620213	137	45055	61	9636360	131	48778	63	9651800	126	52665	65	9666583	120
40	41555	58	9620488	137	45116	61	9636623	131	48841	63	9652052	126	52731	64	9666824	120
41	41613	58	9620763	137	45177	61	9636886	131	48904	64	9652304	125	52797	65	9667065	120
42	41671	58	9621038	137	45238	61	9637148	131	48968	64	9652555	125	52864	64	9667305	120
43	41729	58	9621313	137	45299	61	9637411	131	49032	63	9652806	125	52930	65	9667546	120
44	41788	58	9621587	137	45360	61	9637673	131	49095	64	9653057	125	52996	64	9667786	120
45	41846	58	9621861	137	45421	61	9637935	131	49159	63	9653307	125	53063	65	9668026	120
46	41904	58	9622135	137	45482	61	9638197	131	49222	64	9653558	125	53129	64	9668266	120
47	41962	59	9622409	136	45543	61	9638458	131	49286	64	9653808	125	53196	65	9668506	120
48	42021	58	9622682	136	45604	61	9638720	130	49350	64	9654059	125	53262	64	9668746	120
49	42079	58	9622956	136	45665	61	9638981	130	49414	64	9654309	125	53329	65	9668986	119
50	42137	59	9623229	136	45726	61	9639242	130	49478	64	9654559	124	53396	64	9669225	119
51	42196	58	9623502	136	45787	61	9639503	130	49542	64	9654808	124	53462	65	9669464	119
52	42254	59	9623774	136	45848	62	9639764	130	49606	64	9655057	124	53529	64	9669703	119
53	42313	59	9624047	136	45910	61	9640024	130	49670	64	9655307	124	53596	65	9669942	119
54	42372	59	9624319	136	45971	61	9640284	130	49734	65	9655556	124	53663	64	9670181	119
55	42430	58	9624591	136	46032	61	9640544	130	49798	64	9655805	124	53720	65	9670419	119
56	42489	59	9624863	136	46094	62	9640804	130	49862	64	9656054	124	53787	64	9670658	119
57	42548	59	9625135	135	46155	62	9641064	130	49926	65	9656302	124	53854	65	9670896	119
58	42607	58	9625406	135	46217	61	9641323	130	49991	64	9656551	124	53921	64	9671134	119
59	42665	59	9625677	135	46278	61	9641583	129	40055	64	9656799	124	53988	65	9671372	119

XXVIII. DEGREES.				XXIX. DEGREES.				XXX. DEGREES.				XXXI. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	54065	67	9671609	119	58181	70	9685571	114	62469	72	9698970	109	66934	75	9711839	105
1	54132	67	9671847	118	58251	70	9685799	114	62542	73	9699189	109	67010	76	9712049	105
2	54199	67	9672084	118	58321	70	9686027	114	62615	73	9699407	109	67086	76	9712259	105
3	54267	68	9672321	118	58391	70	9686254	113	62688	73	9699626	109	67162	76	9712469	105
4	54334	67	9672558	118	58461	70	9686482	113	62762	74	9699844	109	67238	76	9712679	105
5	54402	68	9672795	118	58532	71	9686709	113	62835	73	9700062	109	67315	77	9712889	105
6	54469	67	9673032	118	58602	70	9686936	113	62908	73	9700280	109	67391	76	9713098	104
7	54536	67	9673268	118	58672	70	9687163	113	62981	73	9700498	109	67467	76	9713308	104
8	54604	68	9673505	118	58742	70	9687389	113	63054	73	9700716	108	67543	77	9713517	104
9	54672	68	9673741	118	58813	71	9687616	113	63128	74	9700933	108	67620	77	9713726	104
10	54739	67	9673977	118	58883	70	9687843	113	63201	73	9701151	108	67696	76	9713935	104
11	54807	68	9674213	118	58954	71	9688069	113	63275	74	9701368	108	67772	76	9714144	104
12	54874	67	9674448	118	59025	71	9688295	113	63348	73	9701585	108	67849	77	9714352	104
13	54942	68	9674684	117	59095	70	9688521	113	63422	74	9701802	108	67925	76	9714561	104
14	55010	68	9674919	117	59166	71	9688747	113	63495	73	9702019	108	68002	77	9714769	104
15	55078	68	9675155	117	59237	71	9688972	113	63569	74	9702236	108	68078	76	9714978	104
16	55146	68	9675390	117	59307	71	9689198	112	63643	74	9702452	108	68155	77	9715186	104
17	55214	68	9675625	117	59378	71	9689423	112	63716	73	9702669	108	68232	77	9715394	104
18	55282	68	9675859	117	59449	70	9689648	112	63780	74	9702885	108	68309	77	9715601	104
19	55350	68	9676094	117	59520	71	9689873	112	63864	74	9703101	108	68386	77	9715809	104
20	55418	68	9676328	117	59591	71	9690098	112	63938	74	9703317	108	68463	77	9716017	104
21	55486	68	9676562	117	59662	71	9690323	112	64012	74	9703533	108	68540	77	9716224	103
22	55554	68	9676796	117	59733	71	9690548	112	64086	74	9703749	107	68617	77	9716432	103
23	55623	69	9677030	117	59804	71	9690772	112	64160	74	9703964	107	68694	77	9716639	103
24	55691	68	9677264	117	59875	71	9690996	112	64234	74	9704179	107	68771	77	9716846	103
25	55759	68	9677498	116	59947	72	9691220	112	64308	74	9704395	107	68848	77	9717053	103
26	55827	69	9677731	116	60018	71	9691444	112	64382	75	9704610	107	68925	77	9717259	103
27	55896	68	9677964	116	60089	71	9691668	112	64457	74	9704825	107	69002	78	9717466	103
28	55964	69	9678197	116	60160	71	9691892	112	64531	74	9705040	107	69080	77	9717672	103
29	56033	69	9678430	116	60232	72	9692115	112	64605	75	9705254	107	69157	77	9717879	103
30	56102	68	9678663	116	60303	71	9692339	111	64680	74	9705469	107	69234	78	9718085	103
31	56170	69	9678895	116	60375	72	9692562	111	64754	75	9705683	107	69312	77	9718291	103
32	56239	68	9679128	116	60446	71	9692785	111	64829	74	9705897	107	69389	78	9718497	103
33	56307	69	9679360	116	60518	72	9693009	111	64903	75	9706112	107	69467	77	9718703	103
34	56376	69	9679592	116	60590	72	9693231	111	64978	74	9706326	106	69544	78	9718909	103
35	56445	69	9679824	116	60661	71	9693453	111	65052	75	9706539	106	69622	78	9719114	102
36	56514	69	9680056	115	60733	72	9693676	111	65127	75	9706753	106	69700	77	9719320	102
37	56583	69	9680288	115	60805	72	9693898	111	65202	75	9706967	106	69777	78	9719525	102
38	56652	69	9680519	115	60877	72	9694120	111	65277	74	9707180	106	69855	78	9719730	102
39	56721	69	9680750	115	60949	72	9694342	111	65351	75	9707393	106	69933	78	9719935	102
40	56790	69	9680982	115	61020	71	9694564	111	65426	75	9707606	106	70011	78	9720140	102
41	56859	69	9681213	115	61092	72	9694786	111	65501	75	9707819	106	70089	78	9720345	102
42	56928	69	9681443	115	61164	72	9695007	111	65576	75	9708032	106	70167	78	9720549	102
43	56997	69	9681674	115	61237	73	9695229	110	65651	75	9708245	106	70245	78	9720754	102
44	57066	69	9681905	115	61309	72	9695450	110	65726	75	9708457	106	70323	78	9720958	102
45	57136	70	9682135	115	61381	72	9695671	110	65801	76	9708670	106	70401	78	9721162	102
46	57205	69	9682365	115	61453	72	9695892	110	65877	75	9708882	106	70479	78	9721366	102
47	57275	69	9682595	115	61525	72	9696113	110	65952	75	9709094	106	70558	78	9721570	102
48	57344	69	9682825	115	61598	73	9696334	110	66027	75	9709306	106	70636	78	9721774	102
49	57413	69	9683055	115	61670	72	9696554	110	66102	75	9709518	106	70714	78	9721978	102
50	57483	70	9683284	115	61742	72	9696774	110	66178	76	9709730	105	70793	79	9722181	102
51	57552	69	9683514	115	61815	73	9696995	110	66253	75	9709941	105	70871	78	9722385	101
52	57622	70	9683743	114	61887	72	9697215	110	66229	76	9710153	105	70950	79	9722588	101
53	57692	70	9683972	114	61960	73	9697435	110	66404	75	9710364	105	71028	78	9722791	101
54	57761	69	9684201	114	62033	73	9697654	110	66480	76	9710575	105	71107	79	9722994	101
55	57831	70	9684430	114	62105	72	9697874	110	66556	76	9710786	105	71186	79	9723197	101
56	57901	70	9684658	114	62178	73	9698094	110	66631	75	9710997	105	71264	78	9723400	101
57	57971	70	9684887	114	62251	73	9698313	109	66707	76	9711208	105	71343	79	9723603	101
58	58041	70	9685175	114	62324	73	9698532	109	66883	76	9711419	105	71422	79	9723805	101
59	58111	70	9685343	114	62397	73	9698751	109	66859	75	9711629	105	71501	79	9724007	101

XXXII DEGREES.				XXXIII DEGREES.				XXXIV DEGREES.				XXXV DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	71580	79	9724210	101	76409	82	9736109	97	81426	85	9747562	93	86636	89	9758591	90
1	71659	79	9724412	101	76491	82	9736303	97	81511	85	9747749	93	86724	89	9758772	90
2	71738	79	9724614	101	76573	82	9736498	97	81596	85	9747936	93	86813	89	9758952	90
3	71817	79	9724816	101	76655	82	9736692	97	81682	85	9748123	93	86901	89	9759132	90
4	71896	79	9725017	101	76737	82	9736886	97	81767	85	9748310	93	86990	89	9759312	90
5	71975	79	9725219	101	76820	82	9737080	97	81853	85	9748497	93	87079	89	9759492	90
6	72054	79	9725420	101	76902	82	9737274	97	81938	85	9748683	93	87167	89	9759672	90
7	72133	80	9725622	101	76984	82	9737467	96	82024	85	9748870	93	87256	89	9759851	90
8	72213	79	9725823	101	77067	82	9737661	96	82109	85	9749056	93	87345	89	9760031	90
9	72292	80	9726024	100	77149	82	9737855	96	82195	85	9749242	93	87434	89	9760211	90
10	72372	79	9726225	100	77232	82	9738048	96	82281	85	9749429	93	87523	89	9760390	90
11	72451	80	9726426	100	77314	82	9738241	96	82366	85	9749615	93	87612	89	9760569	90
12	72531	79	9726626	100	77397	82	9738434	96	82452	85	9749801	93	87701	89	9760748	90
13	72610	80	9726827	100	77480	82	9738627	96	82538	85	9749987	93	87790	89	9760927	90
14	72690	80	9727027	100	77562	82	9738820	96	82624	85	9750172	93	87879	89	9761106	90
15	72769	79	9727228	100	77645	82	9739013	96	82710	85	9750358	93	87969	89	9761285	90
16	72849	80	9727428	100	77728	82	9739205	96	82796	85	9750543	92	88058	89	9761464	90
17	72929	80	9727628	100	77811	82	9739398	96	82882	85	9750729	92	88147	89	9761642	90
18	73009	80	9727828	100	77894	82	9739590	96	82968	85	9750914	92	88237	89	9761821	90
19	73089	80	9728027	100	77977	82	9739783	96	83055	85	9751099	92	88326	89	9761999	90
20	73169	80	9728227	100	78060	82	9739975	96	83141	85	9751284	92	88416	89	9762177	90
21	73249	80	9728427	100	78143	82	9740167	96	83227	85	9751469	92	88505	89	9762356	90
22	73329	80	9728626	99	78226	82	9740359	96	83313	85	9751654	92	88595	89	9762534	90
23	73409	80	9728825	99	78309	82	9740550	95	83400	85	9751838	92	88685	89	9762712	90
24	73489	80	9729024	99	78393	82	9740742	95	83486	85	9752023	92	88774	89	9762899	90
25	73569	80	9729223	99	78476	82	9740934	95	83573	85	9752207	92	88864	89	9763067	90
26	73649	81	9729422	99	78559	82	9741125	95	83659	85	9752392	92	88954	89	9763245	90
27	73730	80	9729621	99	78643	82	9741316	95	83746	85	9752576	92	89044	89	9763422	90
28	73810	80	9729819	99	78726	82	9741507	95	83833	85	9752760	92	89134	89	9763600	90
29	73890	81	9730018	99	78810	82	9741699	95	83920	85	9752944	92	89224	89	9763777	90
30	73971	80	9730216	99	78893	82	9741889	95	84006	85	9753128	92	89314	89	9763954	90
31	74051	81	9730415	99	78977	82	9742080	95	84093	85	9753312	92	89404	89	9764131	90
32	74132	81	9730613	99	79061	82	9742271	95	84180	85	9753495	92	89494	89	9764308	90
33	74213	80	9730811	99	79145	82	9742462	95	84267	85	9753679	91	89585	89	9764485	90
34	74293	81	9731009	99	79228	82	9742652	95	84354	85	9753862	91	89675	89	9764662	90
35	74374	81	9731206	99	79312	82	9742842	95	84441	85	9754046	91	89765	89	9764838	90
36	74455	80	9731404	98	79396	82	9743033	95	84528	85	9754229	91	89856	89	9765015	90
37	74535	81	9731601	98	79480	82	9743223	95	84615	85	9754412	91	89946	89	9765191	90
38	74616	81	9731799	98	79564	82	9743413	95	84702	85	9754595	91	90037	89	9765367	90
39	74697	81	9731996	98	79648	82	9743602	95	84790	85	9754778	91	90127	89	9765544	90
40	74778	81	9732193	98	79732	82	9743792	95	84877	85	9754960	91	90218	89	9765720	90
41	74859	81	9732390	98	79816	82	9743982	95	84965	85	9755143	91	90309	89	9765896	90
42	74940	81	9732587	98	79901	82	9744171	94	85052	85	9755326	91	90399	89	9766071	90
43	75021	82	9732784	98	79985	82	9744361	94	85140	85	9755508	91	90490	89	9766247	90
44	75103	81	9732980	98	80069	82	9744550	94	85227	85	9755690	91	90581	89	9766423	90
45	75184	81	9733177	98	80154	82	9744739	94	85315	85	9755872	91	90672	89	9766598	90
46	75265	82	9733373	98	80238	82	9744928	94	85402	85	9756054	91	90763	89	9766774	90
47	75347	81	9733569	98	80323	82	9745117	94	85490	85	9756236	91	90854	89	9766949	90
48	75428	81	9733765	98	80407	82	9745306	94	85578	85	9756418	91	90945	89	9767124	90
49	75509	82	9733961	98	80492	82	9745494	94	85666	85	9756600	91	91036	89	9767300	90
50	75591	81	9734157	98	80576	82	9745683	94	85754	85	9756781	91	91127	89	9767475	90
51	75672	82	9734353	98	80661	82	9745871	94	85842	85	9756963	91	91219	89	9767649	90
52	75754	82	9734548	97	80746	82	9746059	94	85930	85	9757144	90	91310	89	9767824	90
53	75836	81	9734744	97	80831	82	9746248	94	86018	85	9757326	90	91401	89	9767999	90
54	75917	82	9734939	97	80916	82	9746436	94	86106	85	9757507	90	91493	89	9768173	90
55	75999	82	9735134	97	81000	82	9746624	94	86194	85	9757688	90	91584	89	9768348	90
56	76081	82	9735330	97	81085	82	9746811	94	86282	85	9757869	90	91676	89	9768522	90
57	76163	82	9735525	97	81170	82	9746999	94	86370	85	9758049	90	91767	89	9768697	90
58	76245	82	9735719	97	81256	82	9747187	93	86459	85	9758230	90	91859	89	9768871	90
59	76327	82	9735914	97	81341	82	9747374	93	86547	85	9758411	90	91951	89	9769045	90

XXXVI. DEGREES.				XXXVII. DEGREES.				XXXVIII. DEGREES.				XXXIX. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	92042	91	9769219	87	97651	95	9779463	84	103468	99	9789342	81	109497	102	9798872	78
1	92134	92	9769392	87	97747	96	9779631	84	103567	99	9789504	81	109600	103	9799028	78
2	92226	92	9769566	87	97842	95	9779798	83	103665	98	9789665	80	109702	103	9799184	77
3	92318	92	9769740	87	97937	95	9779965	83	103764	99	9789827	80	109805	102	9799339	77
4	92410	92	9769913	87	98033	96	9780133	83	103863	99	9789988	80	109907	103	9799495	77
5	92502	92	9770087	87	98128	95	9780300	83	103962	99	9790149	80	110010	102	9799651	77
6	92594	92	9770260	86	98224	96	9780467	83	104061	99	9790310	80	110112	102	9799806	77
7	92688	92	9770433	86	98319	95	9780634	83	104160	99	9790471	80	110215	103	9799962	77
8	92779	91	9770606	86	98415	96	9780801	83	104259	99	9790632	80	110318	103	9800117	77
9	92871	92	9770779	86	98511	96	9780968	83	104359	100	9790793	80	110421	103	9800272	77
10	92963	92	9770952	86	98606	95	9781134	83	104458	99	9790954	80	110524	103	9800427	77
11	93055	93	9771125	86	98702	96	9781301	83	104557	99	9791115	80	110626	102	9800582	77
12	93148	92	9771298	86	98798	96	9781467	83	104657	100	9791275	80	110729	103	9800737	77
13	93240	93	9771470	86	98894	96	9781634	83	104756	99	9791436	80	110823	103	9800892	77
14	93333	93	9771643	86	98990	96	9781800	83	104856	100	9791596	80	110936	103	9801047	77
15	93426	93	9771815	86	99086	96	9781966	83	104956	99	9791757	80	111039	103	9801201	77
16	93518	92	9771987	86	99182	96	9782132	83	105055	99	9791917	80	111142	103	9801356	77
17	93611	93	9772159	86	99278	96	9782298	83	105154	99	9792077	80	111245	103	9801511	77
18	93704	93	9772331	86	99374	96	9782464	83	105254	100	9792237	80	111349	104	9801665	77
19	93796	92	9772503	86	99471	97	9782630	83	105354	100	9792397	80	111452	103	9801819	77
20	93889	93	9772675	86	99567	96	9782796	82	105454	100	9792557	79	111556	103	9801973	77
21	93982	93	9772847	86	99663	96	9782961	82	105554	100	9792716	79	111659	104	9802128	77
22	94075	93	9773018	86	99760	97	9783127	82	105654	100	9792876	79	111763	104	9802282	77
23	94168	93	9773190	86	99856	96	9783292	82	105754	100	9793035	79	111867	103	9802435	77
24	94261	93	9773361	86	99953	97	9783457	82	105854	100	9793195	79	111970	104	9802589	77
25	94355	93	9773533	85	100049	96	9783623	82	105954	100	9793354	79	112074	104	9802743	77
26	94448	93	9773704	85	100146	97	9783788	82	106054	100	9793513	79	112178	104	9802897	76
27	94541	93	9773875	85	100243	97	9783953	82	106154	101	9793673	79	112282	104	9803050	76
28	94634	93	9774046	85	100340	97	9784118	82	106255	100	9793832	79	112386	104	9803204	76
29	94728	94	9774217	85	100436	96	9784282	82	106355	100	9793991	79	112490	104	9803357	76
30	94821	93	9774388	85	100533	97	9784447	82	106455	101	9794150	79	112594	104	9803510	76
31	94915	94	9774558	85	100620	97	9784612	82	106556	101	9794308	79	112698	104	9803664	76
32	95008	93	9774729	85	100727	97	9784776	82	106657	100	9794467	79	112802	104	9803817	76
33	95102	94	9774899	85	100824	97	9784941	82	106757	101	9794626	79	112907	104	9803970	76
34	95196	94	9775070	85	100922	96	9785105	82	106858	101	9794784	79	113011	104	9804123	76
35	95289	93	9775240	85	101019	97	9785269	82	106959	101	9794942	79	113115	105	9804276	76
36	95383	94	9775410	85	101116	97	9785433	82	107060	101	9795101	79	113220	104	9804427	76
37	95577	94	9775580	85	101213	97	9785597	82	107161	101	9795259	79	113324	105	9804581	76
38	95571	94	9775750	85	101311	98	9785761	82	107262	101	9795417	79	113429	105	9804734	76
39	95665	94	9775920	85	101408	97	9785925	82	107363	101	9795557	79	113534	105	9804886	76
40	95759	94	9776090	85	101506	98	9786089	82	107464	101	9795733	79	113638	104	9805038	76
41	95853	94	9776259	85	101603	97	9786252	81	107565	101	9796891	79	113743	105	9805191	76
42	96947	94	9776429	85	101701	98	9786416	81	107666	101	9796049	78	113848	105	9805343	76
43	96041	94	9776598	85	101798	97	9786579	81	107767	101	9796206	78	113953	105	9805495	76
44	96136	95	9776768	84	101896	98	9786742	81	107868	102	9796364	78	114058	105	9805647	76
45	96230	94	9776937	84	101994	98	9786906	81	107970	101	9796521	78	114163	105	9805799	76
46	96324	94	9777106	84	102092	98	9787069	81	108071	102	9796679	78	114268	105	9805951	76
47	96419	95	9777275	84	102190	98	9787232	81	108173	102	9796836	78	114373	106	9806103	76
48	96513	94	9777444	84	102288	98	9787395	81	108274	102	9796993	78	114479	105	9806254	76
49	96608	95	9777613	84	102386	98	9787557	81	108376	102	9797150	78	114584	105	9806406	76
50	96702	94	9777781	84	102484	98	9787720	81	108477	101	9797307	78	114689	105	9806557	76
51	96797	95	9777950	84	102582	98	9787883	81	108579	102	9797464	78	114795	106	9806709	75
52	96892	95	9778119	84	102680	98	9788045	81	108681	102	9797621	78	114900	105	9806860	75
53	97986	94	9778287	84	102778	78	9788208	81	108783	102	9797777	78	115006	106	9807011	75
54	97081	95	9778455	84	102877	99	9788370	81	108885	102	9797934	78	115111	105	9807163	75
55	97176	95	9778623	84	102975	98	9788532	81	108987	102	9798091	78	115217	106	9807314	75
56	97271	95	9778792	84	103074	99	9788694	81	109089	102	9798247	78	115323	105	9807465	75
57	97366	95	9778960	84	103172	98	9788856	81	109191	102	9798403	78	115428	106	9807615	75
58	97461	95	9779128	84	103271	99	9789018	81	109293	102	9798560	78	115534	105	9807766	75
59	97556	95	9779295	84	103369	99	9789180	81	109395	102	9798716	78	115640	106	9807917	75

XL. DEGREES.				XLI. DEGREES.				XLII. DEGREES.				XLIII. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	115746	106	9808068	75	122220	110	9816943	72	128927	114	9825511	70	135873	118	9833783	67
1	115852	106	9808218	75	122330	110	9817088	72	129040	113	9825651	70	135990	117	9833919	67
2	115958	106	9808368	75	122440	110	9817233	72	129154	114	9825791	70	136118	118	9834054	67
3	116064	106	9808519	75	122550	110	9817378	72	129268	114	9825931	70	136226	118	9834189	67
4	116171	107	9808669	75	122660	110	9817523	72	129382	114	9826071	70	136344	118	9834325	67
5	116277	106	9808819	75	122770	110	9817668	72	129496	114	9826211	70	136462	118	9834460	67
6	116383	106	9808969	75	122880	110	9817813	72	129610	114	9826351	70	136581	119	9834595	67
7	116490	107	9809119	75	122990	111	9817958	72	129724	114	9826491	70	136699	118	9834730	67
8	116596	107	9809269	75	123101	111	9818103	72	129839	115	9826631	70	136817	118	9834865	67
9	116702	106	9809419	75	123211	110	9818247	72	129953	114	9826770	70	136936	119	9834999	67
10	116809	107	9809569	75	123322	111	9818392	72	130067	114	9826910	70	137054	118	9835134	67
11	116916	107	9809718	75	123432	110	9818536	72	130181	114	9827049	69	137173	119	9835269	67
12	117023	106	9809868	75	123543	111	9818681	72	130296	115	9827189	69	137291	118	9835403	67
13	117129	107	9810017	75	123653	111	9818825	72	130411	115	9827328	69	137410	119	9835538	67
14	117236	107	9810167	75	123764	111	9818969	72	130526	114	9827467	69	137529	118	9835672	67
15	117343	107	9810316	74	123875	111	9819113	72	130640	115	9827606	69	137647	119	9835807	67
16	117450	107	9810465	74	123986	110	9819257	72	130755	115	9827745	69	137766	119	9835941	67
17	117557	107	9810614	74	124096	111	9819401	72	130870	115	9827884	69	137885	119	9836075	67
18	117664	108	9810765	74	124207	111	9819545	72	130985	115	9828023	69	138004	119	9836209	67
19	117772	107	9810912	74	124318	111	9819689	71	131100	115	9828162	69	138123	119	9836343	67
20	117879	107	9811061	74	124429	112	9819832	71	131215	115	9828301	69	138242	120	9836477	67
21	117986	107	9811210	74	124541	111	9819976	71	131330	115	9828439	69	138362	119	9836611	67
22	118093	108	9811358	74	124652	111	9820120	71	131455	115	9828578	69	138481	119	9836745	67
23	118201	107	9811507	74	124763	111	9820263	71	131560	116	9828716	69	138600	120	9836878	67
24	118308	108	9811655	74	124874	112	9820406	71	131676	115	9828855	69	138720	119	9837012	67
25	118416	107	9811804	74	124986	111	9820550	71	131791	116	9828993	69	138839	120	9837146	66
26	118523	108	9811952	74	125097	112	9820693	71	131907	115	9829131	69	138959	120	9837279	66
27	118631	108	9812100	74	125209	112	9820836	71	132022	116	9829269	69	139079	119	9837413	66
28	118739	108	9812248	74	125321	111	9820979	71	132138	116	9829407	69	139198	120	9837546	66
29	118847	108	9812397	74	125432	112	9821122	71	132253	115	9829545	69	139318	120	9837679	66
30	118955	107	9812544	74	125544	112	9821265	71	132369	116	9829683	69	139438	120	9837812	66
31	119062	108	9812692	74	125656	112	9821407	71	132485	116	9829821	69	139558	120	9837945	66
32	119170	109	9812840	74	125768	112	9821550	71	132601	116	9829959	68	139678	120	9838078	66
33	119279	108	9812988	74	125880	112	9821693	71	132717	116	9830097	68	139798	120	9838211	66
34	119387	108	9813135	74	125992	112	9821835	71	132833	116	9830234	68	139918	120	9838344	66
35	119495	108	9813283	74	126104	112	9821977	71	132949	116	9830372	68	140038	120	9838477	66
36	119603	108	9813430	74	126216	112	9822120	71	133065	116	9830509	68	140158	121	9838610	66
37	119711	109	9813578	73	126328	112	9822262	71	133181	116	9830646	68	140279	120	9838742	66
38	119820	108	9813725	73	126440	112	9822404	71	133297	117	9830784	68	140399	120	9838875	66
39	119928	109	9813872	73	126552	113	9822546	71	133414	116	9830921	68	140520	121	9839007	66
40	120037	108	9814019	73	126665	112	9822688	71	133530	117	9831058	68	140640	121	9839140	66
41	120145	109	9814166	73	126777	113	9822830	71	133647	116	9831195	68	140761	120	9839272	66
42	120244	109	9814313	73	126890	112	9822972	71	133763	116	9831332	68	140881	121	9839404	66
43	120363	108	9814460	73	127002	113	9823114	70	133879	117	9831469	68	141002	121	9839536	66
44	120471	109	9814607	73	127115	113	9823255	70	133996	117	9831606	68	141123	121	9839668	66
45	120580	109	9814753	73	127228	113	9823397	70	134113	117	9831742	68	141244	121	9839800	66
46	120689	109	9814900	73	127341	112	9823539	70	134230	117	9831879	68	141365	121	9839932	66
47	120798	109	9815046	73	127453	113	9823680	70	134347	117	9832015	68	141486	121	9840064	66
48	120907	109	9815193	73	127566	113	9823821	70	134464	117	9832152	68	141607	121	9840196	66
49	121016	109	9815339	73	127679	113	9823963	70	134581	117	9832288	68	141728	121	9840328	66
50	121125	109	9815485	73	127792	114	9824104	70	134698	117	9832425	68	141850	122	9840459	66
51	121234	110	9815631	73	127906	113	9824245	70	134815	117	9832561	68	141971	121	9840591	65
52	121344	109	9815778	73	128019	113	9824386	70	134932	118	9832697	68	142092	122	9840722	65
53	121453	109	9815923	73	128132	113	9824527	70	135050	117	9832833	68	142214	121	9840854	65
54	121562	110	9816069	73	128245	114	9824668	70	135167	117	9832969	68	142335	122	9840985	65
55	121672	110	9816215	73	128359	113	9824808	70	135284	118	9833105	68	142457	122	9841116	65
56	121781	110	9816361	73	128472	114	9824949	70	135402	117	9833241	68	142579	121	9841247	65
57	121891	110	9816507	73	128586	115	9825090	70	135519	118	9833377	67	142700	122	9841378	65
58	122001	109	9816652	72	128699	114	9825230	70	135637	118	9833512	67	142822	122	9841509	65
59	122110	110	9816797	72	128813	114	9825370	70	135755	118	9833648	67	142944	122	9841640	65

XLIV. DEGREES.				XLV. DEGREES.				XLVI. DEGREES.				XLVII. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	143066	122	9841771	65	150515	126	9849485	63	158229	131	9856934	61	166217	135	9864127	59
1	143188	122	9841902	65	150641	126	9849611	63	158360	131	9857056	61	166352	135	9864245	59
2	143310	122	9842033	65	150768	127	9849737	63	158491	131	9857178	61	166488	136	9864363	59
3	143432	122	9842163	65	150894	126	9849864	63	158622	131	9857300	61	166623	135	9864481	59
4	143555	123	9842294	65	151021	127	9849990	63	158753	131	9857421	61	166759	136	9864598	59
5	143677	122	9842424	65	151148	127	9850116	63	158884	131	9857543	61	166895	136	9864716	58
6	143799	122	9842555	65	151274	126	9850243	63	159015	131	9857665	61	167031	136	9864833	58
7	143922	123	9842685	65	151401	127	9850367	63	159146	131	9857786	61	167167	136	9864950	58
8	144044	122	9842815	65	151528	127	9850493	63	159278	132	9857908	60	167303	136	9865068	58
9	144167	123	9842946	65	151655	127	9850619	63	159409	131	9858029	60	167439	136	9865185	58
10	144289	122	9843076	65	151782	127	9850745	62	159541	132	9858150	60	167575	136	9865302	58
11	144412	123	9843206	65	151909	127	9850870	62	159672	131	9858272	60	167712	137	9865419	58
12	144535	123	9843336	65	152036	127	9850996	62	159804	132	9858393	60	167848	136	9865536	58
13	144688	123	9843465	65	152163	127	9851121	62	159936	132	9858514	60	167985	137	9865653	58
14	144781	123	9843595	65	152291	128	9851246	62	160068	132	9858635	60	168121	136	9865770	58
15	144904	123	9843725	65	152418	127	9851372	62	160200	132	9858756	60	168258	137	9865887	58
16	145027	123	9843855	65	152546	128	9851497	62	160332	132	9858877	60	168394	136	9866004	58
17	145140	123	9843984	65	152673	127	9851622	62	160464	132	9858998	60	168531	137	9866120	58
18	145273	124	9844114	64	152801	128	9851747	62	160596	132	9859119	60	168668	137	9866237	58
19	145397	123	9844243	64	152929	127	9851872	62	160728	132	9859239	60	168805	137	9866353	58
20	145520	123	9844372	64	153056	128	9851997	62	160860	132	9859360	60	168942	137	9866470	58
21	145644	124	9844502	64	153184	128	9852122	62	160993	133	9859480	60	169079	137	9866586	58
22	145767	123	9844631	64	153312	128	9852247	62	161125	132	9859601	60	169216	137	9866703	58
23	145891	123	9844760	64	153440	128	9852371	62	161258	133	9859721	60	169354	138	9866819	58
24	146014	124	9844889	64	153568	128	9852496	62	161390	133	9859842	60	169491	137	9866935	58
25	146138	124	9845018	64	153696	129	9852620	62	161523	133	9859962	60	169628	138	9867051	58
26	146262	124	9845147	64	153825	128	9852745	62	161656	133	9860082	60	169766	137	9867167	58
27	146386	124	9845276	64	153953	128	9852869	62	161789	133	9860202	60	169903	138	9867283	58
28	146510	124	9845404	64	154081	129	9852994	62	161922	133	9860322	60	170041	138	9867399	58
29	146634	124	9845533	64	154210	128	9853118	62	162055	133	9860442	60	170179	138	9867515	58
30	146758	124	9845662	64	154338	129	9853242	62	162188	133	9860562	60	170317	138	9867631	58
31	146882	124	9845790	64	154467	129	9853366	62	162321	133	9860682	60	170455	138	9867747	58
32	147006	125	9845919	64	154596	128	9853490	62	162454	133	9860802	60	170593	138	9867862	58
33	147131	124	9846047	64	154724	129	9853614	62	162587	134	9860921	60	170731	138	9867978	58
34	147255	125	9846175	64	154853	129	9853738	62	162721	133	9861041	60	170869	138	9868093	58
35	147380	124	9846304	64	154982	129	9853862	62	162854	134	9861161	60	171007	138	9868209	57
36	147504	125	9846432	64	155111	129	9853986	61	162988	134	9861280	60	171145	139	9868324	57
37	147629	124	9846560	64	155240	129	9854109	61	163122	133	9861400	59	171284	138	9868440	57
38	147753	125	9846688	64	155369	129	9854233	61	163255	134	9861519	59	171422	139	9868555	57
39	147878	125	9846816	64	155498	130	9854356	61	163389	134	9861638	59	171561	138	9868670	57
40	148003	125	9846944	64	155628	129	9854480	61	163523	134	9861758	59	171699	129	9868785	57
41	148128	125	9847071	64	155757	129	9854603	61	163657	134	9861877	59	171838	139	9868900	57
42	148253	125	9847199	64	155886	129	9854727	61	163791	134	9861996	59	171977	139	9869015	57
43	148378	125	9847327	64	156016	130	9854850	61	163925	134	9862115	59	172116	139	9869130	57
44	148503	125	9847454	64	156145	129	9854973	61	164059	134	9862234	59	172255	139	9869245	57
45	148628	125	9847582	64	156275	130	9855096	61	164193	134	9862353	59	172394	139	9869360	57
46	148754	126	9847709	64	156405	130	9855219	61	164328	135	9862471	59	172533	139	9869474	57
47	148879	125	9847837	63	156535	129	9855342	61	164462	134	9862590	59	172672	139	9869589	57
48	149004	126	9847964	63	156664	130	9855465	61	164597	135	9862709	59	172811	139	9869704	57
49	149130	125	9848091	63	156794	130	9855588	61	164731	134	9862827	59	172951	130	9869818	57
50	149255	126	9848218	63	156924	130	9855711	61	164866	135	9862946	59	173090	130	9869933	57
51	149381	126	9848345	63	157054	131	9855833	61	165001	135	9863064	59	173230	130	9870047	57
52	149507	126	9848472	63	157184	131	9855956	61	165135	135	9863183	59	173369	130	9870161	57
53	149633	125	9848599	63	157315	130	9856078	61	165270	135	9863301	59	173509	130	9870276	57
54	149758	126	9848726	63	157445	131	9856201	61	165405	135	9863419	59	173649	130	9870390	57
55	149884	126	9848852	63	157576	130	9856323	61	165540	135	9863538	59	173789	130	9870504	57
56	150010	126	9848979	63	157706	130	9856445	61	165675	136	9863656	59	173929	130	9870618	57
57	150136	127	9849106	63	157837	130	9856568	61	165811	135	9863774	59	174069	130	9870732	57
58	150263	126	9849232	63	157967	131	9856690	61	165946	135	9863892	59	174209	130	9870846	57
59	150389	126	9849359	63	158098	130	9856812	61	166081	135	9864010	59	174349	130	9870960	57

XLVIII. DEGREES.				XLIX. DEGREES.				L. DEGREES.				LI. DEGREES.					
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.		
0	174489	140	9871073	57	183057	145	9877780	55	191932	150	9884254	53	201128	156	9890503	51	0
1	174630	141	9871187	57	183203	146	9877890	55	192083	151	9884360	53	201284	156	9890605	51	1
2	174770	140	9871301	57	183348	145	9877999	55	192234	151	9884466	53	201440	156	9890707	51	2
3	174910	140	9871414	56	183493	145	9878109	55	192385	151	9884572	53	201597	157	9890809	51	3
4	175051	141	9871528	56	183639	146	9878219	55	192535	150	9884677	53	201753	156	9890911	51	4
5	175192	141	9871641	56	183785	146	9878328	55	192686	151	9884783	53	201909	156	9891013	51	5
6	175332	140	9871755	56	183931	146	9878438	55	192837	151	9884889	53	202066	157	9891115	51	6
7	175473	141	9871868	56	184077	146	9878547	54	192989	152	9884994	53	202223	157	9891217	51	7
8	175614	141	9871981	56	184223	146	9878656	54	193140	151	9885100	53	202379	156	9891319	51	8
9	175755	141	9872094	56	184369	146	9878766	54	193291	151	9885205	53	202536	157	9891421	51	9
10	175896	141	9872208	56	184515	146	9878875	54	193443	152	9885311	52	202693	157	9891523	51	10
11	176037	141	9872321	56	184661	146	9878984	54	193594	151	9885416	52	202850	157	9891624	51	11
12	176179	142	9872434	56	184807	146	9879093	54	193745	151	9885521	52	203007	157	9891726	51	12
13	176320	141	9872547	56	184954	147	9879202	54	193897	152	9885627	52	203164	157	9891827	51	13
14	176461	141	9872659	56	185100	146	9879311	54	194049	152	9885732	52	203321	157	9891929	51	14
15	176603	142	9872772	56	185247	147	9879420	54	194201	152	9885837	52	203479	158	9892030	50	15
16	176745	142	9872885	56	185393	146	9879529	54	194353	152	9885942	52	203636	157	9892132	50	16
17	176886	141	9872998	56	185540	147	9879637	54	194505	152	9886047	52	203794	158	9892233	50	17
18	177028	142	9873110	56	185687	147	9879746	54	194657	152	9886152	52	203951	157	9892334	50	18
19	177170	142	9873223	56	185834	147	9879855	54	194809	152	9886257	52	204109	158	9892435	50	19
20	177312	142	9873335	56	185981	147	9879963	54	194962	153	9886362	52	204267	158	9892536	50	20
21	177454	142	9873448	56	186128	147	9880072	54	195114	152	9886466	52	204425	158	9892637	50	21
22	177596	142	9873560	56	186275	147	9880180	54	195266	152	9886571	52	204583	158	9892738	50	22
23	177738	142	9873672	56	186422	147	9880289	54	195418	152	9886676	52	204741	158	9892839	50	23
24	177880	142	9873784	56	186560	148	9880397	54	195571	153	9886780	52	204899	158	9892940	50	24
25	178023	143	9873896	56	186717	147	9880505	54	195724	153	9886885	52	205058	159	9893041	50	25
26	178165	142	9874008	56	186865	148	9880613	54	195877	153	9886989	52	205216	158	9893142	50	26
27	178307	142	9874120	56	187012	147	9880721	54	196030	153	9887093	52	205374	158	9893243	50	27
28	178450	143	9874232	56	187160	148	9880830	54	196183	153	9887198	52	205533	159	9893343	50	28
29	178593	142	9874344	56	187308	148	9880938	54	196336	153	9887302	52	205692	159	9893444	50	29
30	178735	143	9874456	56	187456	148	9881045	54	196490	154	9887406	52	205850	158	9893544	50	30
31	178878	143	9874568	56	187604	148	9881153	54	196643	153	9887510	52	206009	159	9893645	50	31
32	179021	143	9874679	56	187752	148	9881261	54	196796	153	9887614	52	206168	159	9893745	50	32
33	179164	143	9874791	56	187900	148	9881369	54	196950	154	9887718	52	206327	159	9893846	50	33
34	179307	143	9874903	56	188048	148	9881477	54	197103	153	9887822	52	206487	160	9893946	50	34
35	179450	143	9875014	56	188196	148	9881584	54	197257	154	9887926	52	206646	159	9894046	50	35
36	179594	144	9875126	55	188345	149	9881692	54	197411	154	9888030	52	206805	159	9894146	50	36
37	179737	143	9875237	55	188493	148	9881799	54	197565	154	9888133	52	206965	160	9894246	50	37
38	179880	144	9875348	55	188642	149	9881907	54	197718	153	9888237	52	207124	159	9894346	50	38
39	180024	144	9875459	55	188790	148	9882014	53	197872	154	9888341	52	207284	160	9894446	50	39
40	180168	144	9875571	55	188939	149	9882121	53	198027	155	9888444	52	207443	159	9894546	50	40
41	180311	143	9875682	55	189088	149	9882228	53	198181	154	9888548	52	207603	160	9894646	50	41
42	180455	144	9875793	55	189237	149	9882336	53	198335	154	9888651	52	207763	160	9894746	50	42
43	180599	144	9875904	55	189386	149	9882443	53	198489	154	9888755	51	207923	160	9894846	50	43
44	180743	144	9876014	55	189535	149	9882550	53	198644	155	9888858	51	208083	160	9894945	50	44
45	180887	144	9876125	55	189684	149	9882657	53	198799	155	9888961	51	208243	161	9895045	50	45
46	181031	144	9876236	55	189833	149	9882764	53	198953	154	9889064	51	208404	160	9895144	50	46
47	181175	144	9876347	55	189983	150	9882871	53	199108	155	9889167	51	208564	161	9895244	50	47
48	181319	145	9876457	55	190132	149	9882977	53	199263	155	9889271	51	208725	160	9895343	50	48
49	181464	145	9876568	55	190282	150	9883084	53	199418	155	9889374	51	208885	161	9895443	50	49
50	181608	144	9876678	55	190431	149	9883191	53	199573	155	9889476	51	209046	161	9895542	50	50
51	181753	145	9876789	55	190581	150	9883297	53	199728	155	9889579	51	209207	161	9895641	50	51
52	181897	144	9876899	55	190731	150	9883404	53	199883	155	9889682	51	209368	161	9895741	50	52
53	182042	145	9877010	55	190881	150	9883510	53	200038	156	9889785	51	209529	161	9895840	49	53
54	182187	145	9877120	55	191031	150	9883617	53	200194	156	9889888	51	209690	161	9895939	49	54
55	182332	145	9877230	55	191181	150	9883723	53	200349	155	9889990	51	209851	161	9896038	49	55
56	182477	145	9877340	55	191331	150	9883829	53	200505	156	9890093	51	210012	161	9896137	49	56
57	182622	145	9877450	55	191481	150	9883936	53	200661	156	9890195	51	210173	162	9896236	49	57
58	182767	145	9877560	55	191632	151	9884042	53	200816	155	9890298	51	210335	161	9896335	49	58
59	182912	145	9877670	55	191782	150	9884148	53	200972	156	9890400	51	210496	162	9896433	49	59

LII. DEGREES.				LIII. DEGREES.				LIV. DEGREES.				LV. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	210658	162	9896532	49	220537	168	9902349	47	230781	173	9907958	46	241409	181	9913364	44
1	210820	162	9896631	49	220705	167	9902444	47	230955	174	9908049	46	241589	180	9913453	44
2	210982	162	9896729	49	220872	168	9902539	47	231128	173	9908141	46	241770	181	9913541	44
3	211144	162	9896828	49	221040	168	9902634	47	231303	175	9908233	45	241951	181	9913630	44
4	211306	162	9896926	49	221208	169	9902729	47	231478	175	9908324	45	242131	180	9913718	44
5	211468	162	9897025	49	221377	168	9902824	47	231652	174	9908416	45	242312	181	9913806	44
6	211630	162	9897123	49	221545	168	9902919	47	231827	175	9908507	45	242493	181	9913894	44
7	211792	162	9897222	49	221713	168	9903014	47	232001	174	9908594	45	242674	182	9913982	44
8	211955	163	9897320	49	221881	169	9903108	47	232176	175	9908690	45	242856	181	9914070	44
9	212217	162	9897418	49	222050	169	9903203	47	232351	175	9908781	45	243037	182	9914158	44
10	212280	163	9897516	49	222219	168	9903298	47	232525	174	9908873	45	243219	181	9914246	44
11	212443	163	9897614	49	222387	169	9903392	47	232700	175	9908964	45	243400	182	9914334	44
12	212605	162	9897712	49	222556	169	9903487	47	232876	176	9909055	45	243582	182	9914422	44
13	212768	163	9897810	49	222725	169	9903581	47	233051	175	9909146	45	243764	182	9914510	44
14	212931	163	9897908	49	222894	169	9903676	47	233226	175	9909237	45	243946	182	9914598	44
15	213094	163	9898006	49	223063	169	9903770	47	233402	176	9909328	45	244128	182	9914685	44
16	213258	164	9898104	49	223232	170	9903864	47	233577	175	9909419	45	244310	182	9914773	43
17	213421	163	9898202	49	223402	169	9903959	47	233753	176	9909510	45	244492	182	9914860	43
18	213584	163	9898299	49	223571	170	9904053	47	233929	176	9909601	45	244674	183	9914948	43
19	213748	164	9898397	49	223741	169	9904147	47	234104	175	9909691	45	244857	183	9915035	43
20	213911	163	9898494	49	223910	170	9904241	47	234270	176	9909782	45	245040	182	9915123	43
21	214075	164	9898592	49	224080	170	9904335	47	234456	176	9909873	45	245222	183	9915210	43
22	214239	164	9898689	49	224250	170	9904429	47	234633	177	9909963	45	245405	183	9915297	43
23	214403	164	9898787	48	224420	170	9904523	47	234809	176	9910054	45	245588	183	9915385	43
24	214567	164	9898884	48	224590	170	9904617	47	234985	176	9910144	45	245771	183	9915472	43
25	214731	164	9898981	48	224760	170	9904711	47	235162	177	9910235	45	245954	183	9915559	43
26	214895	164	9899078	48	224930	170	9904804	47	235338	176	9910325	45	246138	184	9915646	43
27	215059	165	9899176	48	225101	170	9904898	47	235515	177	9910415	45	246321	183	9915733	43
28	215224	165	9899273	48	225271	171	9904992	47	235692	177	9910506	45	246505	184	9915820	43
29	215388	165	9899370	48	225442	170	9905085	47	235869	177	9910596	45	246688	183	9915907	43
30	215553	165	9899467	48	225612	171	9905179	47	236046	177	9910686	45	246872	184	9915994	43
31	215718	165	9899564	48	225783	171	9905272	47	236223	177	9910776	45	247056	184	9916080	43
32	215882	165	9899660	48	225954	171	9905366	46	236400	177	9910866	45	247240	184	9916167	43
33	216047	165	9899757	48	226125	171	9905459	46	236578	178	9910956	45	247424	184	9916254	43
34	216212	165	9899854	48	226296	171	9905552	46	236755	177	9911046	45	247608	185	9916341	43
35	216377	166	9899951	48	226467	172	9905645	46	236933	178	9911136	45	247793	184	9916427	43
36	216543	165	9900047	48	226639	171	9905739	46	237110	177	9911226	45	247977	185	9916514	43
37	216708	165	9900144	48	226810	172	9905832	46	237288	178	9911315	45	248162	184	9916600	43
38	216873	166	9900240	48	226982	171	9905925	46	237466	178	9911405	45	248346	185	9916687	43
39	217039	165	9900337	48	227153	172	9906018	46	237644	178	9911495	45	248531	185	9916773	43
40	217204	166	9900433	48	227325	172	9906111	46	237823	179	9911584	45	248716	185	9916859	43
41	217370	166	9900529	48	227497	172	9906204	46	238001	178	9911674	45	248901	185	9916945	43
42	217536	166	9900626	48	227669	172	9906296	46	238179	178	9911763	45	249086	185	9917032	43
43	217702	166	9900722	48	227841	172	9906389	46	238358	179	9911853	45	249271	186	9917118	43
44	217868	166	9900818	48	228013	172	9906482	46	238536	178	9911942	44	249457	186	9917204	43
45	218034	166	9900914	48	228185	172	9906574	46	238715	179	9912031	44	249642	185	9917290	43
46	218200	166	9901010	48	228357	173	9906667	46	238894	179	9912121	44	249828	186	9917376	43
47	218366	167	9901106	48	228530	172	9906760	46	239073	179	9912210	44	250013	185	9917462	43
48	218533	166	9901202	48	228702	173	9906852	46	239252	179	9912299	44	250199	186	9917548	43
49	218699	167	9901298	48	228875	173	9906945	46	239431	179	9912388	44	250385	186	9917634	43
50	218866	166	9901394	48	229048	173	9907037	46	239610	179	9912477	44	250571	187	9917719	43
51	219032	166	9901489	48	229221	173	9907129	46	239789	180	9912566	44	250757	186	9917805	43
52	219199	167	9901585	48	229394	173	9907222	46	239969	180	9912655	44	250944	186	9917891	43
53	219366	167	9901681	48	229567	173	9907314	46	240149	179	9912744	44	251130	187	9917976	43
54	219533	167	9901776	48	229740	173	9907406	46	240328	180	9912833	44	251317	186	9918062	43
55	219700	167	9901872	48	229913	174	9907498	46	240508	180	9912921	44	251503	187	9918147	43
56	219867	168	9901967	48	230087	173	9907590	46	240688	180	9913010	44	251690	187	9918233	43
57	220035	167	9902063	47	230260	174	9907682	46	240868	180	9913099	44	251877	187	9918318	43
58	220202	167	9902158	47	230434	174	9907774	46	241048	180	9913187	44	252064	187	9918404	43
59	220369	168	9902253	47	230608	173	9907866	46	241228	181	9913276	44	252251	187	9918489	43

LVI. DEGREES.				LVII. DEGREES.				LVIII. DEGREES.				LIX. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	252438	187	9918574	42	263891	194	9923591	41	275790	202	9928420	39	288161	210	9933066	38
1	252626	188	9918659	42	264086	195	9923673	41	275993	203	9928499	39	288371	210	9933141	38
2	252813	187	9918744	42	264281	195	9923755	41	276195	202	9928578	39	288581	210	9933217	38
3	253001	188	9918830	42	264475	194	9923837	41	276397	202	9928657	39	288792	211	9933293	38
4	253189	188	9918915	42	264670	195	9923919	41	276600	203	9928736	39	289003	211	9933369	38
5	253376	187	9919000	42	264866	196	9924001	41	276803	203	9928814	39	289214	211	9933444	38
6	253564	188	9919084	42	265061	195	9924083	41	277006	203	9928893	39	289425	211	9933520	38
7	253752	188	9919169	42	265256	195	9924164	41	277209	203	9928972	39	289636	211	9933596	38
8	253941	189	9919254	42	265452	196	9924246	41	277412	203	9929050	39	289847	212	9933671	38
9	254129	188	9919339	42	265647	195	9924328	41	277615	203	9929129	39	290059	211	9933747	37
10	254317	188	9919424	42	265843	196	9924409	41	277819	204	9929207	39	290270	212	9933822	37
11	254506	189	9919508	42	266039	196	9924491	41	278022	203	9929286	39	290482	212	9933898	37
12	254694	188	9919593	42	266235	196	9924572	41	278226	204	9929364	39	290694	212	9933973	37
13	254883	189	9919677	42	266431	196	9924653	41	278430	204	9929442	39	290906	212	9934048	37
14	255072	189	9919762	42	266627	196	9924735	40	278634	204	9929521	39	291118	212	9934123	37
15	255261	189	9919846	42	266823	197	9924816	40	278838	204	9929599	39	291330	213	9934199	37
16	255450	189	9919931	42	267020	197	9924897	40	279042	204	9929677	39	291543	212	9934274	37
17	255639	190	9920015	42	267216	196	9924979	40	279246	205	9929755	39	291755	213	9934349	37
18	255829	189	9920099	42	267413	197	9925060	40	279451	204	9929833	39	291968	213	9934424	37
19	256018	190	9920184	42	267610	197	9925141	40	279655	205	9929911	39	292181	213	9934499	37
20	256208	190	9920268	42	267807	197	9925222	40	279860	205	9929989	39	292394	213	9934574	37
21	256398	189	9920352	42	268004	197	9925303	40	280065	205	9930067	39	292607	213	9934649	37
22	256587	190	9920436	42	268201	197	9925384	40	280270	205	9930145	39	292820	213	9934723	37
23	256777	190	9920520	42	268399	198	9925465	40	280475	205	9930223	39	293033	214	9934798	37
24	256967	190	9920604	42	268596	197	9925545	40	280680	206	9930300	39	293247	214	9934873	37
25	257158	191	9920688	42	268794	198	9925626	40	280886	205	9930378	39	293461	213	9934948	37
26	257348	190	9920772	42	268991	197	9925707	40	281091	206	9930456	38	293674	214	9935022	37
27	257538	190	9920855	42	269189	198	9925787	40	281297	206	9930533	38	293888	215	9935097	37
28	257729	191	9920939	42	269387	198	9925868	40	281503	206	9930611	38	294103	214	9935171	37
29	257920	191	9921023	42	269585	198	9925949	40	281709	206	9930688	38	294317	214	9935246	37
30	258111	191	9921107	42	269784	199	9926029	40	281915	206	9930766	38	294531	215	9935320	37
31	258302	191	9921190	42	269983	199	9926110	40	282121	207	9930843	38	294746	214	9935395	37
32	258493	191	9921274	42	270181	198	9926190	40	282328	206	9930920	38	294960	215	9935469	37
33	258684	191	9921357	42	270379	199	9926270	40	282534	207	9930998	38	295175	215	9935543	37
34	258875	191	9921441	41	270578	198	9926351	40	282741	206	9931075	38	295390	215	9935618	37
35	259066	192	9921524	41	270777	199	9926431	40	282947	207	9931152	38	295605	215	9935692	37
36	259258	192	9921607	41	270976	199	9926511	40	283154	207	9931229	38	295820	216	9935766	37
37	259450	191	9921691	41	271175	199	9926591	40	283361	207	9931306	38	296036	215	9935840	37
38	259641	192	9921774	41	271374	199	9926671	40	283568	207	9931383	38	296251	216	9935914	37
39	259833	192	9921857	41	271573	200	9926751	40	283776	208	9931460	38	296467	216	9935988	37
40	260025	192	9921940	41	271773	200	9926831	40	283983	207	9931537	38	296683	216	9936062	37
41	260217	193	9922023	41	271973	200	9926911	40	284191	208	9931614	38	296899	216	9936136	37
42	260410	192	9922106	41	272172	200	9926991	40	284399	208	9931691	38	297115	216	9936210	37
43	260602	193	9922189	41	272372	200	9927071	40	284606	208	9931768	38	297331	217	9936284	37
44	260795	192	9922272	41	272572	200	9927151	40	284814	208	9931845	38	297548	216	9936357	37
45	260987	193	9922355	41	272772	201	9927231	40	285022	209	9931921	38	297764	217	9936431	37
46	261180	193	9922438	41	272973	201	9927310	40	285231	208	9931998	38	297981	217	9936505	37
47	261373	193	9922520	41	273173	201	9927390	40	285439	209	9932075	38	298198	217	9936578	37
48	261566	193	9922603	41	273374	201	9927469	40	285648	208	9932151	38	298415	217	9936652	37
49	261759	193	9922686	41	273574	201	9927549	40	285856	209	9932228	38	298632	217	9936725	37
50	261952	193	9922768	41	273775	201	9927628	40	286065	209	9932304	38	298849	218	9936799	36
51	262145	194	9922851	41	273976	201	9927708	39	286274	209	9932380	38	299067	217	9936872	36
52	262339	194	9922933	41	274177	201	9927787	39	286483	209	9932457	38	299284	218	9936946	36
53	262533	193	9923016	41	274378	201	9927867	39	286692	210	9932533	38	299502	218	9937019	36
54	262726	194	9923098	41	274579	202	9927946	39	286902	209	9932609	38	299720	218	9937092	36
55	262920	194	9923180	41	274781	202	9928025	39	287111	210	9932685	38	299938	218	9937165	36
56	263114	194	9923263	41	274983	201	9928104	39	287321	210	9932762	38	300156	218	9937238	36
57	263308	194	9923345	41	275184	202	9928183	39	287531	210	9932838	38	300374	219	9937312	36
58	263502	195	9923427	41	275386	202	9928262	39	287741	210	9932914	38	300593	218	9937385	36
59	263697	194	9923509	41	275588	202	9928341	39	287951	210	9932990	38	300811	219	9937458	36

LX DEGREES.				LXI DEGREES.				LXII DEGREES.				LXIII DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	301030	219	9937531	36	314429	228	9941819	35	328391	238	9945935	33	342953	248	9949881	32
1	301249	218	9937603	36	314657	228	9941889	35	328628	237	9946002	33	343201	248	9949945	32
2	301468	219	9937676	36	314885	228	9941959	35	328866	238	9946069	33	343449	248	9950009	32
3	301687	219	9937749	36	315113	228	9942029	35	329104	238	9946136	33	343698	249	9950074	32
4	301906	219	9937822	36	315342	229	9942099	35	329342	238	9946203	33	343946	248	9950138	32
5	302126	220	9937895	36	315570	228	9942169	35	329581	239	9946270	33	344195	249	9950202	32
6	302346	220	9937967	36	315799	229	9942239	35	329819	238	9946337	33	344444	249	9950266	32
7	302565	219	9938040	36	316028	229	9942308	35	330058	239	9946404	33	344693	249	9950330	32
8	302785	220	9938113	36	316257	229	9942378	35	330297	239	9946471	33	344943	240	9950394	32
9	303005	220	9938185	36	316486	229	9942448	35	330536	239	9946538	33	345192	249	9950458	32
10	303226	221	9938258	36	316716	230	9942517	35	330775	239	9946604	33	345441	249	9950522	32
11	303446	220	9938330	36	316945	229	9942587	35	331014	239	9946671	33	345691	250	9950586	32
12	303666	221	9938402	36	317175	230	9942656	34	331254	240	9946738	33	345941	250	9950650	32
13	303887	221	9938475	36	317405	230	9942725	34	331494	240	9946804	33	346192	251	9950714	32
14	304108	221	9938547	36	317635	230	9942795	34	331734	240	9946871	33	346442	250	9950778	32
15	304329	221	9938619	36	317865	230	9942864	34	331974	240	9946937	33	346693	251	9950841	32
16	304550	221	9938691	36	318095	231	9942934	34	332214	240	9947004	33	346943	250	9950905	32
17	304771	221	9938763	36	318326	231	9943003	34	332454	240	9947070	33	347194	251	9950968	32
18	304993	222	9938836	36	318557	231	9943072	34	332694	240	9947136	33	347445	251	9951032	32
19	305215	221	9938908	36	318787	230	9943141	34	332935	241	9947203	33	347695	250	9951096	32
20	305436	221	9938980	36	319018	231	9943210	34	333175	241	9947269	33	347946	251	9951159	31
21	305658	222	9939051	36	319250	232	9943279	34	333417	242	9947335	33	348198	252	9951222	31
22	305880	222	9939123	36	319481	231	9943348	34	333659	242	9947401	33	348450	252	9951286	31
23	306102	222	9939195	36	319712	231	9943417	34	333900	241	9947467	33	348703	253	9951349	31
24	306324	222	9939267	36	319944	232	9943486	34	334141	241	9947533	33	348956	253	9951412	31
25	306547	223	9939339	36	320176	232	9943555	34	334383	242	9947599	33	349208	252	9951476	31
26	306769	222	9939410	36	320408	232	9943624	34	334625	242	9947665	33	349461	253	9951539	31
27	306991	222	9939482	36	320640	232	9943693	34	334867	242	9947731	33	349713	252	9951602	31
28	307215	224	9939554	36	320872	232	9943761	34	335109	242	9947797	33	349966	253	9951665	31
29	307438	223	9939625	36	321105	233	9943830	34	335351	242	9947863	33	350219	253	9951728	31
30	307661	223	9939697	36	321337	232	9943890	34	335594	243	9947929	33	350473	254	9951791	31
31	307885	224	9939768	36	321570	233	9943967	34	335837	243	9947995	33	350726	253	9951856	31
32	308108	223	9939840	36	321803	233	9944036	34	336080	243	9948060	33	350980	254	9951917	31
33	308332	224	9939911	35	322036	233	9944104	34	336323	243	9948126	33	351234	254	9951980	31
34	308556	224	9939982	35	322269	233	9944173	34	336567	244	9948192	33	351488	254	9952043	31
35	308780	224	9940053	35	322502	233	9944241	34	336810	243	9948257	33	351742	254	9952105	31
36	309004	224	9940125	35	322736	234	9944309	34	337054	244	9948323	33	351996	254	9952168	31
37	309228	224	9940196	35	322970	234	9944377	34	337297	243	9948388	33	352251	255	9952231	31
38	309452	224	9940267	35	323204	234	9944446	34	337541	244	9948453	32	352505	254	9952294	31
39	309677	225	9940338	35	323438	234	9944514	34	337786	245	9948519	32	352760	255	9952356	31
40	309902	225	9940409	35	323672	234	9944582	34	338030	244	9948584	32	353016	256	9952419	31
41	310127	225	9940480	35	323906	235	9944650	34	338274	244	9948649	33	353271	255	9952481	31
42	310352	225	9940551	35	324141	235	9944718	34	338519	245	9948715	32	353526	255	9952544	31
43	310577	225	9940622	35	324375	234	9944786	34	338764	245	9948780	32	353782	256	9952606	31
44	310802	226	9940693	35	324610	235	9944854	34	338764	244	9948845	32	354038	256	9952669	31
45	311028	226	9940763	35	324845	235	9944922	34	339008	246	9948910	32	354294	256	9952731	31
46	311253	225	9940834	35	324845	236	9944922	34	339254	246	9948910	32	354294	256	9952731	31
47	311479	225	9940905	35	325081	236	9944990	34	339500	246	9948975	32	354550	257	9952793	31
48	311705	226	9940975	35	325316	235	9945058	34	339745	245	9949040	32	354807	257	9952855	31
49	311931	226	9941046	35	325552	236	9945126	34	339991	246	9949105	32	355063	256	9952917	31
50	312157	226	9941117	35	325787	236	9945193	34	340237	246	9949170	32	355320	257	9952980	31
51	312384	227	9941187	35	326023	236	9945261	34	340483	246	9949235	32	355577	257	9952980	31
52	312611	227	9941258	35	326259	236	9945328	34	340729	246	9949300	32	355835	258	9953042	31
53	312837	227	9941328	35	326495	236	9945396	34	340975	246	9949364	32	356092	257	9953104	31
54	313064	226	9941398	35	326732	237	9945464	34	341222	247	9949429	32	356349	257	9953166	31
55	313291	227	9941468	35	326968	237	9945531	33	341469	247	9949494	32	356607	258	9953228	31
56	313518	227	9941539	35	327205	237	9945598	33	341716	247	9949558	32	356865	258	9953290	31
57	313746	228	9941609	35	327442	237	9945666	33	341963	247	9949623	32	357124	259	9953352	31
58	313973	227	9941679	35	327679	237	9945733	33	342210	247	9949688	32	357382	258	9953413	31
59	314201	228	9941749	35	327916	237	9945801	33	342458	248	9949752	32	357640	258	9953475	31
					328153	237	9945868	33	342705	247	9949816	32	357899	259	9953537	31
						238				248						31

LXIV. DEGREES.				LXV. DEGREES.				LXVI. DEGREES.				LXVII. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	358158	259	9953660	31	374051	270	9957276	29	390687	284	9960730	28	408122	297	9964026	27
1	358417	259	9953722	31	374323	272	9957395	29	390971	284	9960786	28	408420	298	9964080	27
2	358677	260	9953783	31	374594	271	9957393	29	391255	284	9960843	28	408718	298	9964133	26
3	358936	259	9953845	31	374865	271	9957452	29	391539	284	9960899	28	409016	298	9964187	26
4	359196	260	9953906	31	375137	272	9957511	29	391824	285	9960955	28	409314	298	9964241	26
5	359456	260	9953968	31	375409	272	9957570	29	392108	284	9961011	28	409613	299	9964294	26
6	359716	260	9954029	30	375681	272	9957628	29	392393	285	9961067	28	409912	299	9964347	26
7	359976	260	9954090	30	375953	272	9957687	29	392678	285	9961123	28	410211	299	9964400	26
8	360236	261	9954152	30	376226	273	9957746	29	392964	286	9961179	28	410511	300	9964454	26
9	360497	261	9954213	30	376498	272	9957804	29	393249	285	9961235	28	410810	299	9964507	26
10	360758	261	9954274	30	376771	273	9957863	29	393535	286	9961290	27	411110	300	9964560	26
11	361019	261	9954335	30	377044	273	9957921	29	393821	286	9961346	27	411410	300	9964613	26
12	361280	261	9954396	30	377318	274	9957979	29	394108	287	9961402	27	411711	301	9964666	26
13	361542	262	9954457	30	377591	273	9958038	29	394394	286	9961458	27	412012	301	9964719	26
14	361803	262	9954518	30	377865	274	9958096	29	394681	287	9961513	27	412313	301	9964773	26
15	362065	262	9954579	30	378139	274	9958154	29	394968	287	9961569	27	412614	301	9964826	26
16	362327	262	9954640	30	378413	274	9958212	29	395255	287	9961624	27	412915	301	9964879	26
17	362589	263	9954701	30	378687	274	9958271	29	395543	288	9961680	27	413216	301	9964931	26
18	362852	262	9954762	30	378962	275	9958329	29	395830	287	9961735	27	413518	302	9964984	26
19	363114	263	9954823	30	379237	275	9958387	29	396118	288	9961791	27	413820	302	9965037	26
20	363377	263	9954884	30	379512	275	9958445	29	396406	288	9961846	27	414123	303	9965090	26
21	363640	263	9954944	30	379787	275	9958503	29	396695	289	9961902	27	414426	303	9965143	26
22	363903	264	9955005	30	380062	275	9958561	28	396983	288	9961957	27	414728	302	9965195	26
23	364167	263	9955065	30	380338	276	9958619	28	397272	289	9962012	27	415032	304	9965248	26
24	364430	264	9955126	30	380614	276	9958677	28	397561	289	9962067	27	415335	303	9965301	26
25	364694	264	9955186	30	380890	276	9958734	28	397851	290	9962123	27	415639	304	9965353	26
26	364958	264	9955247	30	381166	276	9958792	28	398140	289	9962178	27	415942	303	9965406	26
27	365222	264	9955307	30	381442	276	9958850	28	398430	290	9962233	27	416246	304	9965458	26
28	365486	265	9955368	30	381719	277	9958908	28	398720	290	9962288	27	416551	305	9965511	26
29	365751	265	9955428	30	381996	277	9958965	28	399010	290	9962343	27	416855	304	9965563	26
30	366016	265	9955488	30	382273	277	9959023	28	399300	290	9962398	27	417160	305	9965615	26
31	366281	265	9955548	30	382550	277	9959081	28	399591	291	9962453	27	417465	305	9965668	26
32	366546	265	9955609	30	382828	278	9959138	28	399882	291	9962508	27	417771	306	9965720	26
33	366811	266	9955669	30	383106	278	9959195	28	400173	291	9962562	27	418076	305	9965772	26
34	367077	265	9955729	30	383384	278	9959253	28	400464	291	9962617	27	418382	305	9965824	26
35	367342	266	9955789	30	383662	278	9959310	28	400756	292	9962672	27	418688	306	9965876	26
36	367608	266	9955849	30	383940	278	9959368	28	401048	292	9962727	27	418995	307	9965928	26
37	367874	267	9955909	30	384219	279	9959425	28	401340	292	9962781	27	419301	306	9965981	26
38	368141	266	9955969	30	384498	279	9959482	28	401632	292	9962836	27	419608	307	9966033	26
39	368407	267	9956029	30	384777	279	9959539	28	401925	293	9962890	27	419915	307	9966085	26
40	368674	267	9956089	30	385056	279	9959596	28	402217	292	9962945	27	420223	308	9966137	26
41	368941	267	9956148	30	385335	279	9959653	28	402510	293	9962999	27	420531	308	9966188	26
42	369208	267	9956208	30	385615	280	9959711	28	402804	294	9963054	27	420838	307	9966240	26
43	369476	268	9956268	30	385895	280	9959768	28	403097	293	9963108	27	421146	308	9966292	26
44	369743	267	9956327	30	386175	280	9959825	28	403391	294	9963162	27	421455	309	9966344	25
45	370011	268	9956387	30	386455	280	9959882	28	403685	294	9963217	27	421764	309	9966395	25
46	370279	268	9956447	30	386736	281	9959938	28	403979	294	9963271	27	422073	309	9966447	25
47	370547	268	9956506	29	387017	281	9959995	28	404273	294	9963325	27	422382	309	9966499	25
48	370816	269	9956566	29	387298	281	9960052	28	404568	295	9963379	27	422691	309	9966550	25
49	371084	268	9956625	29	387579	281	9960109	28	404863	295	9963434	27	423001	310	9966602	25
50	371353	269	9956684	29	387860	281	9960166	28	405159	296	9963488	27	423311	310	9966653	25
51	371621	269	9956744	29	388142	282	9960222	28	405454	295	9963542	27	423621	310	9966705	25
52	371891	270	9956803	29	388424	282	9960279	28	405749	295	9963596	27	423932	311	9966756	25
53	372160	269	9956862	29	388706	282	9960335	28	406045	296	9963650	27	424243	311	9966807	25
54	372430	270	9956922	29	388988	282	9960392	28	406341	296	9963704	27	424554	311	9966859	25
55	372700	270	9956981	29	389271	283	9960448	28	406637	296	9963757	27	424865	311	9966910	25
56	372970	270	9957040	29	389554	283	9960505	28	406933	296	9963811	27	425176	311	9966961	25
57	373240	270	9957099	29	389837	283	9960561	28	407230	297	9963865	27	425488	312	9967003	25
58	373510	270	9957158	29	390120	283	9960618	28	407527	297	9963919	27	425800	312	9967064	25
59	373781	270	9957217	29	390403	284	9960674	28	407825	297	9963972	27	426112	313	9967115	25

LXVIII. DEGREES.				LXIX. DEGREES.				LXX. DEGREES.				LXXI. DEGREES.			
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.
0426425	313	9967166	25	445671	329	9970152	24	465948	347	9972986	23	487358	367	9975670	21
1426739	313	9967217	25	446000	329	9970200	24	466296	348	9973032	22	487725	367	9975713	21
2427051	314	9967268	25	446330	330	9970249	24	466643	347	9973078	22	488093	368	9975757	21
3427364	313	9967319	25	446659	329	9970297	24	466991	348	9973124	22	488460	367	9975800	21
4427677	313	9967370	25	446990	331	9970345	24	467339	348	9973169	22	488828	368	9975844	21
5427991	314	9967420	25	447320	330	9970394	24	467688	349	9973215	22	489197	369	9975887	21
6428305	314	9967471	25	447651	331	9970442	24	468037	349	9973261	22	489566	369	9975930	21
7428620	315	9967522	25	447982	331	9970490	24	468386	349	9973307	22	489935	369	9975974	21
8428934	314	9967573	25	448313	331	9970538	24	468735	350	9973352	22	490304	370	9976017	21
9429249	315	9967623	25	448644	331	9970586	24	469085	350	9973398	22	490674	370	9976060	21
10429565	316	9967674	25	448976	332	9970635	24	469435	350	9973443	22	491044	370	9976103	21
11429880	315	9967725	25	449308	332	9970683	24	469785	351	9973489	22	491415	371	9976146	21
12430196	316	9967775	25	449641	333	9970731	24	470136	351	9973535	22	491786	371	9976189	21
13430512	316	9967826	25	449974	333	9970779	24	470487	352	9973580	22	492157	371	9976232	21
14430828	316	9967876	25	450307	333	9970826	23	470839	351	9973625	22	492529	372	9976275	21
15431145	317	9967927	25	450640	333	9970874	23	471190	352	9973671	22	492901	372	9976318	21
16431461	316	9967977	25	450973	333	9970922	23	471542	352	9973716	22	493273	372	9976361	21
17431778	317	9968027	25	451307	334	9970970	23	471895	353	9973761	22	493646	373	9976404	21
18432095	318	9968078	25	451642	335	9971018	23	472247	352	9973807	22	494019	373	9976446	21
19432413	318	9968128	25	451976	334	9971065	23	472600	353	9973852	22	494392	373	9976489	21
20432731	318	9968178	25	452311	335	9971113	23	472954	354	9973897	22	494766	374	9976532	21
21433049	319	9968228	25	452646	335	9971161	23	473307	353	9973942	22	495140	374	9976574	21
22433368	318	9968278	25	452981	335	9971208	23	473661	354	9973987	22	495515	375	9976617	21
23433686	319	9968328	25	453317	336	9971256	23	474016	355	9974032	22	495890	375	9976660	21
24434005	319	9968379	25	453653	336	9971303	23	474370	355	9974077	22	496265	375	9976702	21
25434324	320	9968429	25	453989	336	9971351	23	474725	355	9974122	22	496640	375	9976745	21
26434644	320	9968479	24	454325	337	9971398	23	475080	356	9974167	22	497016	376	9976787	21
27434964	320	9968528	24	454662	337	9971446	23	475436	356	9974212	22	497393	377	9976830	21
28435284	320	9968578	24	454999	338	9971493	23	475792	356	9974257	22	497769	377	9976872	21
29435604	321	9968628	24	455337	338	9971540	23	476148	357	9974302	22	498146	378	9976914	21
30435925	320	9968678	24	455675	338	9971588	23	476505	357	9974347	22	498524	378	9976957	21
31436245	321	9968728	24	456013	338	9971635	23	476862	357	9974391	22	498901	377	9976999	21
32436566	321	9968777	24	456351	338	9971682	23	477219	358	9974436	22	499279	378	9977041	21
33436888	322	9968827	24	456690	339	9971729	23	477577	358	9974481	22	499658	379	9977083	21
34437210	322	9968877	24	457029	339	9971776	23	477935	358	9974525	22	500037	379	9977125	21
35437532	322	9968926	24	457368	339	9971823	23	478293	358	9974570	22	500416	379	9977167	21
36437854	322	9968976	24	457707	339	9971870	23	478651	359	9974614	22	500796	380	9977209	21
37438176	323	9969025	24	458047	340	9971917	23	479010	359	9974659	22	501176	380	9977251	21
38438499	323	9969075	24	458387	340	9971964	23	479369	360	9974703	22	501556	381	9977293	21
39438822	323	9969124	24	458728	341	9972011	23	479729	360	9974747	22	501937	381	9977335	21
40439145	322	9969173	24	459069	341	9972058	23	480089	360	9974792	22	502318	381	9977377	21
41439469	324	9969223	24	459410	341	9972105	23	480449	361	9974836	22	502699	382	9977419	21
42439793	324	9969272	24	459751	341	9972151	23	480810	361	9974880	22	503081	382	9977461	21
43440117	324	9969321	24	460093	342	9972198	23	481171	361	9974925	22	503463	383	9977503	21
44440442	325	9969370	24	460435	342	9972245	23	481532	361	9974969	22	503846	383	9977544	21
45440766	324	9969420	24	460777	342	9972291	23	481893	362	9975013	22	504228	384	9977586	21
46441091	325	9969469	24	461120	343	9972338	23	482255	363	9975057	22	504612	384	9977628	21
47441417	325	9969518	24	461463	343	9972385	23	482618	362	9975101	22	504996	385	9977669	21
48441742	325	9969567	24	461806	343	9972431	23	482980	363	9975145	22	505380	385	9977711	21
49442068	326	9969616	24	462150	344	9972477	23	483343	363	9975189	22	505764	385	9977752	21
50442394	326	9969665	24	462493	343	9972524	23	483706	364	9975233	22	506149	385	9977794	21
51442720	326	9969714	24	462837	344	9972570	23	484070	364	9975277	22	506534	385	9977835	21
52443047	327	9969762	24	463182	345	9972617	23	484434	364	9975321	22	506919	386	9977877	21
53443374	327	9969811	24	463526	344	9972663	23	484798	365	9975365	22	507305	387	9977918	21
54443701	327	9969860	24	463871	345	9972709	23	485163	365	9975408	22	507692	386	9977959	21
55444029	328	9969909	24	464217	346	9972755	23	485528	365	9975452	22	508078	388	9978001	20
56444357	328	9969957	24	464563	346	9972802	23	485893	366	9975496	22	508466	387	9978042	20
57444685	328	9970006	24	464908	345	9972848	23	486259	366	9975539	22	508853	387	9978083	20
58445013	329	9970055	24	465255	347	9972894	23	486625	366	9975583	21	509241	388	9978124	20
59445342	329	9970103	24	465601	346	9972940	23	486991	367	9975626	21	509626	388	9978165	20

LXXII. DEGREES.				LXXIII. DEGREES.				LXXIV. DEGREES.				LXXV. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	510018	389	9978206	20	534065	413	9980596	19	559662	440	9982842	18	587004	471	9984944	17
1	510407	389	9978247	20	534478	413	9980635	19	560103	441	9982878	18	587476	472	9984978	17
2	510796	389	9978288	20	534891	413	9980673	19	560544	441	9982914	18	587948	472	9985011	16
3	511186	390	9978329	20	535306	415	9980712	19	560986	442	9982950	18	588421	473	9985045	16
4	511576	390	9978370	20	535721	415	9980751	19	561428	442	9982986	18	588894	473	9985079	16
5	511967	391	9978411	20	536136	415	9980789	19	561871	443	9983022	18	589368	474	9985112	16
6	512357	390	9978452	20	536552	416	9980827	19	562314	443	9983058	18	589843	475	9985146	16
7	512749	392	9978493	20	536968	416	9980866	19	562758	444	9983094	18	590318	475	9985180	16
8	513141	392	9978533	20	537384	416	9980904	19	563202	444	9983130	18	590793	475	9985213	16
9	513533	392	9978574	20	537801	417	9980942	19	563647	445	9983166	18	591269	476	9985247	16
10	513925	392	9978615	20	538218	417	9980980	19	564092	445	9983202	18	591746	477	9985280	16
11	514318	393	9978655	20	538636	418	9981019	19	564538	446	9983238	18	592223	477	9985314	16
12	514711	393	9978696	20	539054	418	9981057	19	564984	446	9983273	17	592701	478	9985347	16
13	515105	394	9978736	20	539473	419	9981095	19	565431	447	9983309	17	593180	479	9985380	16
14	515499	394	9978777	20	539892	419	9981133	19	565878	447	9983345	17	593659	479	9985414	16
15	515893	394	9978817	20	540312	420	9981171	19	566325	447	9983380	17	594138	479	9985447	16
16	516288	395	9978858	20	540732	420	9981209	19	566773	448	9983416	17	594618	480	9985480	16
17	516684	396	9978898	20	541152	420	9981247	19	567222	449	9983452	17	595099	481	9985513	16
18	517079	395	9978939	20	541573	421	9981285	19	567672	450	9983487	17	595580	481	9985547	16
19	517475	396	9978979	20	541994	421	9981323	19	568121	449	9983523	17	596062	482	9985580	16
20	517872	397	9979019	20	542416	422	9981361	19	568571	450	9983558	17	596545	483	9985613	16
21	518269	397	9979059	20	542838	422	9981399	19	569022	451	9983594	17	597028	483	9985646	16
22	518666	397	9979100	20	543261	423	9981436	19	569473	451	9983629	17	597511	483	9985679	16
23	519064	398	9979140	20	543684	423	9981474	19	569925	452	9983664	17	597995	484	9985712	16
24	519462	398	9979180	20	544107	424	9981512	19	570377	452	9983700	17	598480	485	9985745	16
25	519860	398	9979220	20	544531	425	9981549	19	570830	453	9983735	17	598965	485	9985778	16
26	520259	399	9979260	20	544956	425	9981587	19	571283	453	9983770	17	599451	486	9985811	16
27	520658	399	9979300	20	545381	425	9981625	19	571737	454	9983805	17	599938	487	9985843	16
28	521058	400	9979340	20	545806	425	9981662	18	572191	454	9983840	17	600425	487	9985876	16
29	521458	400	9979380	20	546232	426	9981699	18	572646	455	9983875	17	600912	488	9985909	16
30	521858	401	9979419	20	546658	426	9981737	18	573101	455	9983910	17	601400	488	9985942	16
31	522259	401	9979459	20	547085	427	9981774	18	573557	456	9983945	17	601880	489	9985974	16
32	522660	401	9979499	20	547512	427	9981812	18	574013	456	9983980	17	602379	490	9986007	16
33	523062	402	9979539	20	547940	428	9981849	18	574470	457	9984015	17	602869	490	9986039	16
34	523464	402	9979578	20	548368	428	9981886	18	575927	457	9984050	17	603359	490	9986072	16
35	523867	403	9979618	20	548796	428	9981886	18	575927	458	9984050	17	603359	491	9986072	16
36	524270	403	9979658	20	548796	429	9981924	18	575385	458	9984085	17	603850	491	9986104	16
37	524673	403	9979697	20	549225	429	9981961	18	575385	459	9984085	17	603850	492	9986104	16
38	525077	404	9979737	20	549655	430	9981998	18	576844	459	9984120	17	604342	492	9986137	16
39	525481	404	9979776	20	549655	430	9981998	18	576303	459	9984155	17	604834	492	9986169	16
40	525885	404	9979816	20	550085	430	9982035	18	576762	459	9984189	17	605327	493	9986202	16
41	526290	405	9979855	20	550085	430	9982035	18	577222	460	9984224	17	605821	494	9986234	16
42	526696	405	9979895	20	550515	431	9982072	18	577682	460	9984259	17	606315	494	9986266	16
43	527102	406	9979934	20	550946	431	9982109	18	578143	461	9984293	17	606810	495	9986299	16
44	527508	406	9979973	20	551377	432	9982146	18	578605	462	9984328	17	607305	495	9986331	16
45	527914	406	9980012	20	551809	432	9982183	18	579067	462	9984363	17	607801	496	9986363	16
46	528322	406	9980052	19	552241	433	9982220	18	579530	463	9984397	17	608297	496	9986395	16
47	528729	407	9980091	19	552674	433	9982257	18	579530	463	9984397	17	608297	497	9986427	16
48	529137	408	9980130	19	553107	434	9982294	18	579993	463	9984432	17	608794	498	9986459	16
49	529545	408	9980169	19	553541	434	9982331	18	580456	464	9984466	17	609292	498	9986491	16
50	529954	409	9980208	19	553975	435	9982367	18	580920	464	9984500	17	609790	499	9986523	16
51	530363	409	9980247	19	554410	435	9982404	18	581385	465	9984535	17	610289	500	9986555	16
52	530773	410	9980286	19	554845	435	9982441	18	581851	466	9984569	17	610789	500	9986587	16
53	531183	410	9980325	19	555280	436	9982477	18	582316	466	9984603	17	611289	501	9986619	16
54	531593	411	9980364	19	555716	437	9982514	18	582783	467	9984637	17	611790	501	9986651	16
55	532004	411	9980403	19	556153	437	9982551	18	583249	468	9984672	17	612291	502	9986683	16
56	532415	412	9980441	19	556590	437	9982587	18	583717	468	9984706	17	612793	503	9986714	16
57	532827	412	9980480	19	557027	438	9982624	18	584185	468	9984740	17	613296	503	9986746	16
58	533239	413	9980519	19	557465	438	9982660	18	584653	469	9984774	17	613799	504	9986778	16
59	533652	413	9980558	19	557904	439	9982696	18	585122	469	9984808	17	614303	504	9986809	16
					558342	440	9982733	18	585592	470	9984842	17	614807	506	9986841	16
					558782	440	9982769	18	586062	471	9984876	17	615313	506	9986873	16
					559222	440	9982805	18	586533	471	9984910	17	615819	506		16

LXXVI. DEGREES.				LXXVII. DEGREES.				LXXVIII. DEGREES.				LXXIX. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	616325	500	9986904	16	647912	547	9988724	14	682121	594	9990404	13	719401	649	9991947	12
1	616832	507	9986936	16	648460	548	9988753	14	682716	595	9990431	13	720552	651	9991971	12
2	617340	508	9986967	15	649008	548	9988782	14	683312	596	9990458	13	720703	652	9991996	12
3	617848	509	9986998	15	649557	549	9988811	14	683908	596	9990485	13	721355	653	9992020	12
4	618357	509	9987030	15	650107	550	9988840	14	684505	597	9990511	13	722008	654	9992044	12
5	618866	509	9987061	15	650657	550	9988869	14	685104	599	9990538	13	722662	654	9992069	12
6	619376	510	9987092	15	651208	551	9988898	14	685703	599	9990565	13	723318	657	9992093	12
7	619886	510	9987124	15	651760	552	9988927	14	686302	601	9990591	13	723975	658	9992117	12
8	620398	512	9987155	15	652313	553	9988956	14	686903	602	9990618	13	724633	659	9992142	12
9	620910	512	9987187	15	652866	553	9988985	14	687505	602	9990644	13	725292	659	9992166	12
10	621423	513	9987217	15	653420	554	9989014	14	688107	603	9990671	13	725951	661	9992190	12
11	621937	514	9987248	15	653975	555	9989043	14	688711	604	9990697	13	726612	662	9992214	12
12	622451	514	9987279	15	654531	556	9989071	14	689315	605	9990724	13	727274	663	9992238	12
13	622965	514	9987310	15	655088	557	9989100	14	689920	606	9990750	13	727937	663	9992263	12
14	623481	516	9987341	15	655645	557	9989128	14	690526	607	9990777	13	728600	665	9992287	12
15	623997	516	9987372	15	656203	558	9989157	14	691133	608	9990803	13	729265	666	9992311	12
16	624513	517	9987403	15	656761	558	9989186	14	691741	609	9990829	13	729931	667	9992335	12
17	625020	518	9987434	15	657321	560	9989214	14	692350	609	9990855	13	730598	668	9992358	12
18	625548	519	9987465	15	657881	561	9989243	14	692959	611	9990882	13	731266	669	9992382	12
19	626067	519	9987495	15	658442	562	9989270	14	693570	611	9990908	13	731935	670	9992406	12
20	626586	520	9987526	15	659004	562	9989291	14	694181	612	9990934	13	732605	672	9992430	12
21	627106	521	9987557	15	659566	563	9989328	14	694793	614	9990960	13	733277	672	9992454	12
22	627627	521	9987588	15	660129	565	9989356	14	695407	614	9990986	13	733949	674	9992478	12
23	628148	521	9987618	15	660694	565	9989384	14	696021	615	9991012	13	734623	675	9992501	12
24	628670	522	9987649	15	661258	564	9989413	14	696636	615	9991038	13	735297	676	9992525	12
25	629192	523	9987679	15	661824	564	9989441	14	697251	617	9991064	13	735973	676	9992549	12
26	629715	524	9987710	15	662390	566	9989469	14	697868	618	9991090	13	736649	678	9992572	12
27	630239	525	9987740	15	662957	567	9989497	14	698486	619	9991115	13	737327	679	9992596	12
28	630764	525	9987771	15	663525	568	9989525	14	699105	619	9991141	13	738006	680	9992619	12
29	631289	526	9987801	15	664094	569	9989553	14	699724	621	9991167	13	738686	681	9992643	12
30	631815	526	9987831	15	664663	569	9989581	14	700345	621	9991193	13	739367	682	9992666	12
31	632341	527	9987862	15	665234	571	9989609	14	700966	622	9991218	13	740049	683	9992689	12
32	632868	528	9987892	15	665805	571	9989637	14	701588	624	9991244	13	740732	685	9992713	11
33	633396	529	9987922	15	666376	571	9989665	14	702212	624	9991270	13	741417	685	9992736	11
34	633925	529	9987952	15	666949	573	9989693	14	702836	625	9991295	13	742102	687	9992759	11
35	634454	530	9987983	15	667522	573	9989721	14	703461	626	9991321	13	742789	688	9992783	11
36	634984	531	9988013	15	668097	575	9989749	14	704087	627	9991346	13	743477	688	9992806	11
37	635515	531	9988043	15	668672	575	9989777	14	704714	628	9991372	13	744166	690	9992829	11
38	636046	532	9988073	15	669247	575	9989804	14	705342	629	9991397	13	744856	691	9992852	11
39	636578	533	9988103	15	669824	577	9989832	14	705971	630	9991423	13	745547	692	9992875	11
40	637111	533	9988133	15	670401	577	9989869	14	706601	631	9991448	13	746239	694	9992898	11
41	637644	534	9988163	15	670979	578	9989887	14	707232	631	9991473	13	746933	694	9992921	11
42	638178	535	9988193	15	671558	579	9989915	14	707863	632	9991498	13	747637	696	9992944	11
43	638713	536	9988223	15	672139	581	9989942	14	708496	634	9991524	12	748323	697	9992967	11
44	639249	536	9988252	15	672719	580	9989970	14	709130	634	9991549	12	749020	698	9992990	11
45	639785	536	9988282	15	673300	581	9989997	14	709764	636	9991574	12	749718	699	9993013	11
46	640321	538	9988312	15	673883	583	9990025	14	710400	636	9991599	12	750417	700	9993036	11
47	640859	538	9988342	15	674466	583	9990052	14	711036	638	9991624	12	751117	702	9993059	11
48	641397	539	9988371	15	675049	585	9990079	14	711674	639	9991649	12	751819	703	9993081	11
49	641936	540	9988401	15	675634	585	9990107	14	712313	639	9991674	12	752522	704	9993104	11
50	642476	540	9988430	15	676220	586	9990134	14	712952	640	9991699	12	753226	705	9993127	11
51	643016	541	9988460	15	676806	586	9990161	14	713592	642	9991724	12	753931	706	9993149	11
52	643557	542	9988489	15	677393	587	9990188	14	714234	642	9991749	12	754637	707	9993172	11
53	644099	543	9988519	15	677981	588	9990215	14	714876	644	9991774	12	755344	709	9993195	11
54	644642	543	9988548	15	678570	589	9990243	13	715520	644	9991799	12	756053	710	9993217	11
55	645185	544	9988578	15	679160	590	9990270	13	716164	646	9991823	12	756763	711	9993240	11
56	645729	545	9988607	15	679751	591	9990297	13	716810	646	9991848	12	757474	712	9993262	11
57	646274	545	9988636	15	680342	591	9990324	13	717456	647	9991873	12	758186	713	9993284	11
58	646819	546	9988666	14	680934	592	9990351	13	718103	649	9991897	12	758899	715	9993307	11
59	647365	547	9988695	14	681527	593	9990377	13	718752	649	9991922	12	759614	716	9993329	11

LXXX. DEGREES.				LXXXI. DEGREES.				LXXXII. DEGREES.				LXXXIII. DEGREES.				
No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	No. I.	II.	No. III.	IV.	
0	760330	716	9993352	11	805668	797	9994620	10	856445	898	9995753	9	914105	1027	9996751	8
1	761047	717	9993374	11	806466	798	9994640	10	857345	900	9995770	9	915136	1031	9996766	8
2	761765	718	9993396	11	807266	800	9994660	10	858246	901	9995788	9	916168	1032	9996782	8
3	762485	720	9993418	11	808067	803	9994680	10	859150	904	9995806	9	917203	1035	9996797	8
4	763206	721	9993440	11	808870	803	9994700	10	860056	906	9995823	9	918241	1038	9996812	8
5	763928	722	9993462	11	809675	805	9994719	10	860963	907	9995841	9	919281	1040	9996828	8
6	764651	723	9993484	11	810481	806	9994739	10	861873	910	9995859	9	920324	1043	9996843	8
7	765375	724	9993506	11	811288	807	9994759	10	862784	911	9995876	9	921369	1045	9996858	8
8	766101	726	9993528	11	812097	809	9994779	10	863697	913	9995894	9	922417	1048	9996874	8
9	766828	727	9993550	11	812908	819	9994798	10	864612	915	9995911	9	923467	1050	9996889	8
10	767556	728	9993572	11	813720	812	9994818	10	865530	918	9995928	9	924520	1053	9996904	8
11	768285	729	9993594	11	814534	814	9994838	10	866449	919	9995946	9	925576	1056	9996919	8
12	769016	731	9993616	11	815349	815	9994857	10	867370	921	9995963	9	926634	1058	9996934	8
13	769748	732	9993638	11	816166	817	9994877	10	868294	924	9995980	9	927695	1061	9996949	7
14	770481	733	9993660	11	816984	818	9994896	10	869219	925	9995998	9	928758	1063	9996964	7
15	771216	735	9993681	11	817804	820	9994916	10	870146	927	9996015	9	929824	1066	9996979	7
16	771952	736	9993703	11	818626	822	9994935	10	871075	929	9996032	9	930893	1069	9996994	7
17	772689	737	9993725	11	819449	823	9994955	10	872007	932	9996049	9	931964	1071	9997009	7
18	773427	738	9993746	11	820274	825	9994974	10	872940	933	9996066	9	933038	1074	9997024	7
19	774167	740	9993768	11	821100	826	9994993	10	873875	935	9996083	9	934115	1077	9997039	7
20	774908	741	9993789	11	821928	828	9995013	9	874813	938	9996100	9	935194	1079	9997053	7
21	775651	743	9993811	11	822758	830	9995032	9	875752	939	9996117	9	936277	1083	9997068	7
22	776395	744	9993832	11	823589	831	9995051	9	876694	942	9996134	9	937361	1084	9997083	7
23	777140	745	9993854	11	824422	833	9995070	9	877638	944	9996151	9	938449	1088	9997098	7
24	777886	746	9993875	11	825256	834	9995089	9	878583	945	9996168	9	939540	1091	9997112	7
25	778633	747	9993896	11	826092	838	9995108	9	879531	948	9996185	9	940633	1093	9997127	7
26	779382	749	9993918	11	826930	838	9995127	9	880481	950	9996202	9	941729	1096	9997141	7
27	780132	750	9993939	10	827770	840	9995146	9	881433	952	9996218	9	942828	1099	9997156	7
28	780884	752	9993960	10	828611	841	9995165	9	882388	955	9996235	9	943929	1101	9997170	7
29	781637	753	9993981	10	829454	843	9995184	9	883344	956	9996252	9	945034	1105	9997185	7
30	782391	754	9994003	10	830298	844	9995203	9	884302	958	9996269	9	946141	1107	9997199	7
31	783146	755	9994024	10	831144	846	9995222	9	885263	961	9996285	8	947252	1111	9997214	7
32	783903	757	9994045	10	831992	846	9995241	9	886226	963	9996302	8	948365	1113	9997228	7
33	784662	759	9994066	10	832841	849	9995260	9	887191	965	9996318	8	949481	1116	9997242	7
34	785422	760	9994087	10	833693	852	9995278	9	888158	967	9996335	8	950600	1119	9997257	7
35	786183	761	9994108	10	834546	853	9995297	9	889127	969	9996351	8	951721	1121	9997271	7
36	786945	762	9994129	10	835400	854	9995316	9	890099	972	9996368	8	952846	1125	9997285	7
37	787709	764	9994150	10	836257	857	9995334	9	891073	974	9996384	8	953974	1128	9997299	7
38	788474	765	9994171	10	837115	858	9995353	9	892049	976	9996400	8	955105	1131	9997313	7
39	789240	766	9994191	10	837975	860	9995372	9	893027	978	9996417	8	956238	1133	9997327	7
40	790008	768	9994212	10	838836	861	9995390	9	894008	981	9996433	8	957375	1137	9997341	7
41	790778	770	9994233	10	839700	864	9995409	9	894990	982	9996449	8	958515	1140	9997355	7
42	791549	771	9994254	10	840565	865	9995427	9	895975	985	9996465	8	959658	1143	9997369	7
43	792321	772	9994274	10	841431	866	9995445	9	896963	988	9996482	8	960803	1145	9997383	7
44	793094	773	9994295	10	842300	869	9995464	9	897952	989	9996498	8	961952	1149	9997397	7
45	793869	775	9994316	10	843170	870	9995482	9	898944	992	9996514	8	963104	1152	9997411	7
46	794646	777	9994336	10	844043	873	9995500	9	899938	994	9996530	8	964259	1155	9997425	7
47	795423	777	9994357	10	844917	874	9995519	9	900935	997	9996546	8	965418	1159	9997439	7
48	796203	780	9994377	10	845792	875	9995537	9	901934	999	9996562	8	966579	1161	9997452	7
49	796983	783	9994397	10	846670	879	9995555	9	902935	1001	9996578	8	967743	1164	9997466	7
50	797766	783	9994418	10	847549	882	9995573	9	903938	1003	9996594	8	968911	1168	9997480	7
51	798549	785	9994438	10	848431	883	9995591	9	904944	1006	9996610	8	970081	1170	9997493	7
52	799334	787	9994459	10	849314	885	9995609	9	905953	1009	9996625	8	971256	1175	9997507	7
53	800121	788	9994479	10	850199	886	9995628	9	906963	1010	9996641	8	972433	1177	9997521	7
54	800909	789	9994499	10	851085	889	9995646	9	907976	1013	9996657	8	973614	1181	9997534	7
55	801698	791	9994519	10	851974	890	9995663	9	908992	1016	9996673	8	974797	1183	9997547	7
56	802489	792	9994540	10	852864	893	9995681	9	910010	1018	9996688	8	975984	1187	9997561	7
57	803281	794	9994560	10	853757	894	9995699	9	911030	1020	9996704	8	977175	1189	9997574	7
58	804075	796	9994580	10	854651	896	9995717	9	912053	1023	9996720	8	978368	1193	9997588	7
59	804871	797	9994600	10	855547	898	9995735	9	913078	1025	9996735	8	979565	1197	9997601	7

LXXXIV. DEGREES.					LXXXV. DEGREES.					LXXXVI. DEGREES.					LXXXVII. DEGREES.				
No. I.	II.	No. III.	IV.		No. I.	II.	No. III.	IV.		No. I.	II.	No. III.	IV.		No. I.	II.	No. III.	IV.	
0	980765	1200	9997614	7	1059704	1442	9998344	5		1156416	1803	9998941	4		1281200	2404	9999404	3	0
1	981969	1204	9997628	7	1061150	1446	9998355	5		1158226	1810	9998950	4		1283617	2417	9999411	3	1
2	983176	1207	9997641	6	1062602	1452	9998366	5		1160044	1818	9998958	4		1286048	2431	9999418	3	2
3	984387	1211	9997654	6	1064058	1456	9998377	5		1161870	1826	9998967	4		1288492	2444	9999424	3	3
4	985600	1213	9997667	6	1065519	1461	9998388	5		1163703	1833	9998976	4		1290951	2459	9999431	3	4
5	986818	1218	9997680	6	1066985	1466	9998399	5		1165544	1841	9998984	4		1293423	2472	9999437	3	5
6	988039	1221	9997693	6	1068456	1471	9998410	5		1167393	1849	9998993	4		1295910	2487	9999444	3	6
7	989263	1224	9997706	6	1069932	1476	9998420	5		1169251	1858	9999002	4		1298411	2501	9999450	3	7
8	990490	1227	9997719	6	1071413	1481	9998431	5		1171116	1865	9999010	4		1300927	2518	9999456	3	8
9	991722	1232	9997732	6	1072900	1487	9998442	5		1172989	1873	9999019	4		1303457	2530	9999462	3	9
10	992957	1235	9997745	6	1074391	1491	9998453	5		1174870	1881	9999027	4		1306002	2545	9999469	3	10
11	994195	1238	9997758	6	1075888	1497	9998464	5		1176760	1890	9999036	4		1308561	2559	9999475	3	11
12	995437	1242	9997771	6	1077389	1501	9998474	5		1178657	1897	9999044	4		1311137	2576	9999481	3	12
13	996682	1245	9997784	6	1078897	1508	9998485	5		1180564	1907	9999052	4		1313728	2591	9999487	3	13
14	997931	1249	9997797	6	1080409	1512	9998495	5		1182478	1914	9999061	4		1316335	2607	9999494	3	14
15	999184	1253	9997809	6	1081927	1518	9998506	5		1184402	1924	9999069	4		1318957	2622	9999500	3	15
16	1000441	1257	9997822	6	1083450	1523	9998516	5		1186333	1931	9999077	4		1321595	2638	9999506	3	16
17	1001701	1260	9997835	6	1084978	1528	9998527	5		1188274	1941	9999086	4		1324249	2654	9999512	3	17
18	1002964	1263	9997847	6	1086512	1534	9998537	5		1190223	1949	9999094	4		1326920	2671	9999518	3	18
19	1004232	1268	9997859	6	1088050	1538	9998548	5		1192181	1958	9999102	4		1329607	2687	9999524	3	19
20	1005503	1271	9997873	6	1089596	1546	9998558	5		1194148	1967	9999110	4		1332311	2704	9999529	3	20
21	1006778	1275	9997885	6	1091146	1550	9998568	5		1196124	1976	9999118	4		1335032	2721	9999535	3	21
22	1008057	1279	9997897	6	1092703	1557	9998578	5		1198108	1984	9999126	4		1337770	2738	9999541	3	22
23	1009340	1283	9997910	6	1094264	1566	9998589	5		1200103	1995	9999134	4		1340525	2755	9999547	3	23
24	1010626	1286	9997922	6	1095830	1574	9998599	5		1202106	2003	9999142	4		1343298	2763	9999553	3	24
25	1011917	1291	9997935	6	1097404	1579	9998609	5		1204119	2013	9999150	4		1346089	2791	9999558	3	25
26	1013211	1294	9997947	6	1098983	1585	9998619	5		1206141	2022	9999158	4		1348896	2817	9999564	3	26
27	1014509	1298	9997959	6	1000568	1590	9998629	5		1208172	2031	9999166	4		1351729	2833	9999570	3	27
28	1015811	1302	9997972	6	1002158	1597	9998639	5		1210213	2041	9999174	4		1354572	2843	9999575	3	28
29	1017117	1306	9997984	6	1003755	1602	9998649	5		1212264	2051	9999181	4		1357437	2865	9999581	3	29
30	1018427	1310	9997996	6	1005357	1608	9998659	5		1214325	2061	9999189	4		1360320	2904	9999586	3	30
31	1019741	1314	9998008	6	1006965	1614	9998669	5		1216395	2070	9999197	4		1363224	2922	9999592	3	31
32	1021059	1318	9998020	6	1008579	1620	9998679	5		1218476	2081	9999205	4		1366146	2943	9999597	3	32
33	1022381	1322	9998032	6	1110199	1627	9998689	5		1220566	2090	9999212	4		1369089	2963	9999603	2	33
34	1023707	1326	9998044	6	1111826	1632	9998699	5		1222667	2101	9999220	4		1372052	2983	9999608	2	34
35	1025038	1331	9998056	6	1113458	1639	9998708	5		1224777	2110	9999227	4		1375035	3003	9999614	2	35
36	1026372	1334	9998068	6	1115097	1645	9998718	5		1226899	2122	9999235	4		1378038	3025	9999619	2	36
37	1027711	1339	9998080	6	1116742	1651	9998728	5		1229030	2131	9999242	4		1381063	3046	9999624	2	37
38	1029053	1342	9998092	6	1118393	1658	9998737	5		1231173	2143	9999250	4		1384109	3068	9999629	2	38
39	1030400	1347	9998104	6	1120051	1664	9998747	5		1233325	2152	9999257	4		1387177	3089	9999635	2	39
40	1031751	1351	9998116	6	1121715	1670	9998757	5		1235489	2164	9999265	4		1390266	3111	9999640	2	40
41	1033107	1356	9998127	6	1123385	1677	9998766	5		1237663	2174	9999272	4		1393377	3134	9999645	2	41
42	1034466	1359	9998139	6	1125062	1683	9998776	5		1239846	2183	9999279	4		1396511	3157	9999650	2	42
43	1035830	1364	9998151	6	1126745	1690	9998785	5		1242045	2199	9999286	4		1399668	3180	9999655	2	43
44	1037199	1369	9998163	6	1128435	1697	9998795	5		1244253	2208	9999294	4		1402848	3204	9999660	2	44
45	1038571	1372	9998174	6	1130132	1703	9998804	5		1246472	2219	9999301	4		1406052	3227	9999665	2	45
46	1039948	1377	9998186	6	1131835	1710	9998813	5		1248703	2231	9999308	4		1409279	3252	9999670	2	46
47	1041330	1382	9998197	6	1133545	1717	9998823	5		1250945	2242	9999315	3		1412531	3276	9999675	2	47
48	1042716	1386	9998209	6	1135262	1724	9998832	5		1253198	2253	9999322	3		1415807	3301	9999680	2	48
49	1044106	1390	9998220	6	1136986	1731	9998841	5		1255464	2266	9999329	3		1419108	3326	9999685	2	49
50	1045501	1395	9998232	6	1138717	1737	9998851	5		1257741	2277	9999336	3		1422434	3352	9999689	2	50
51	1046900	1399	9998243	6	1140454	1745	9998860	4		1260031	2290	9999343	3		1425786	3378	9999694	2	51
52	1048304	1404	9998255	6	1142199	1752	9998869	4		1262332	2301	9999350	3		1429164	3405	9999699	2	52
53	1049713	1409	9998266	6	1143951	1758	9998878	4		1264647	2315	9999357	3		1432569	3432	9999704	2	53
54	1051126	1413	9998277	6	1145709	1767	9998887	4		1266973	2327	9999364	3		1436001	3449	9999708	2	54
55	1052544	1418	9998289	6	1147476	1773	9998896	4		126									

LXXXVIII. DEGREES.					LXXXIX. DEGREES.				
	No. I.	II.	No. III.	IV.	No. I.	No. II.	No. III.	IV.	
0	1457181	3603	9999735	2	1758145	7178	9999934	I	0
1	1460814	3633	9999740	2	1795443	7298	9999936	I	1
2	1464477	3663	9999744	2	1772866	7423	9999938	I	2
3	1468172	3695	9999748	2	1780419	7553	9999940	I	3
4	1471898	3726	9999753	2	1788105	7686	9999942	I	4
5	1475657	3759	9999757	2	1795930	7825	9999944	I	5
6	1479449	3792	9999761	2	1803898	7968	9999946	I	6
7	1483274	3825	9999765	2	1812015	8117	9999948	I	7
8	1487133	3859	9999769	2	1820287	8262	9999950	I	8
9	1491026	3893	9999774	2	1828720	8433	9999952	I	9
10	1494955	3929	9999778	2	1837319	8599	9999954	I	10
11	1498920	3965	9999782	2	1846092	8773	9999956	I	11
12	1502922	4002	9999786	2	1855047	8955	9999958	I	12
13	1506960	4038	9999790	2	1864190	9143	9999959	I	13
14	1511037	4077	9999793	2	1873529	9339	9999961	I	14
15	1505152	4115	9999797	2	1883074	9445	9999963	I	15
16	1509307	4155	9999801	2	1892833	9759	9999964	I	16
17	1523502	4195	9999805	2	1902817	9984	9999966	I	17
18	1527737	4235	9999809	2	1913035	10218	9999968	I	18
19	1532015	4278	9999812	2	1923500	10465	9999969	I	19
20	1536335	4320	9999816	2	1934224	10724	9999971	I	20
21	1540699	4364	9999820	2	1945219	10995	9999972	I	21
22	1545107	4408	9999823	2	1956499	11280	9999974	I	22
23	1549560	4453	9999827	2	1968081	11582	9999975	I	23
24	1554059	4499	9999831	2	1979979	11898	9999976	I	24
25	1558606	4547	9999834	2	1992213	12234	9999977	I	25
26	1563200	4594	9999838	2	1992213	12589	9999979	I	26
27	1567844	4644	9999841	2	2004802	12965	9999980	I	27
28	1572538	4694	9999844	2	2017767	13363	9999981	I	28
29	1577283	4745	9999848	2	2031130	13888	9999982	I	29
30	1582081	4798	9999851	2	2044918	14240	9999983	I	30
31	1586932	4851	9999854	2	2059158	14623	9999984	I	31
32	1591839	4907	9999858	I	2073881	15240	9999985	O	32
33	1596801	4962	9999861	I	2089121	15794	9999986	O	33
34	1601821	5020	9999864	I	2104915	16390	9999987	O	34
35	1606899	5078	9999867	I	2121305	17033	9999988	O	35
36	1612038	5139	9999870	I	2138338	17628	9999989	O	36
37	1617238	5200	9999873	I	2156066	18483	9999990	O	37
38	1622501	5263	9999876	I	2174549	19205	9999991	O	38
39	1627829	5328	9999879	I	2193854	20203	9999992	O	39
40	1633223	5394	9999882	I	2214057	21189	9999993	O	40
41	1638685	5462	9999885	I	2235246	22276	9999993	O	41
42	1644217	5532	9999888	I	2257522	23481	9999994	O	42
43	1649820	5603	9999891	I	2281003	24824	9999995	O	43
44	1655496	5676	9999894	I	2305827	26329	9999995	O	44
45	1661247	5751	9999897	I	2332156	27928	9999996	O	45
46	1667076	5829	9999899	I	2360184	29963	9999996	O	46
47	1672984	5908	9999902	I	2390147	32185	9999997	O	47
48	1678973	5989	9999905	I	2422332	34761	9999997	O	48
49	1685046	6073	9999907	I	2457093	37789	9999998	O	49
50	1681206	6160	9999910	I	2494882	41393	9999998	O	50
51	1697454	6248	9999912	I	2536275	45757	9999999	O	51
52	1693793	6339	9999915	I	2582032	51152	9999999	O	52
53	1710227	6434	9999917	I	2633184	57992	9999999	O	53
54	1716757	6530	9999920	I	2691176	66947	9999999	O	54
55	1723386	6629	9999922	I	2758123	79181	9999999	O	55
56	1720119	6733	9999925	I	2837304	106910	9999999	O	56
57	1726958	6839	9999927	I	2944214	114839	9999999	O	57
58	1743906	6948	9999929	I	3059153	176093	9999999	O	58
59	1750967	7061	9999932	I	3235244	300930	9999999	O	59
		7178			3536274	6463726			

DESCRIPTION OF THE TABLES OF DEGREES AND MINUTES.

EACH page contains four degrees, and each degree occupies five columns.

Over the said columns is placed the degrees, the first is marked 0, the second 1, and so on to 90; the left hand column is the minutes exceeding a degree, over which is M. for minutes.

Over the second column is I. signifying the first number.

Over the third column is II. signifying the second number.

Over the fourth column is III. signifying the third number.

Over the fifth is IV. signifying the fourth number.

The first numbers are used for the degrees of declination of the sun or stars, and for latitude by dead-reckoning, as *per* example:

What is the number for 20 degrees and 1 minute of declination?—Under 20 degrees in the first column, and opposite 1 minute in the left hand column, is 27060.

If for 20 degrees 1 minute and 15 seconds, divide the second number opposite to 1 minute, which is 46 by 4, (15 seconds being one quarter of a minute) which making the additional number 11 to be added to 27060, will be 27071, the number for 20 degrees 1 minute and 15 seconds of declination: if for 20 seconds, divide by 3, 20 seconds being one-third of a minute: if for 30 seconds, divide by 2, 30 seconds being one-half of a minute: if for 40 seconds, divide by 3, and double the quotient, 40 seconds being two-thirds of a minute: if for 45, divide by 4, and multiply the quotient by 3, 45 seconds being three-quarters of a minute; and so on, in proportion for any other part of a minute, when it is required to find the latitude to a quarter, or any other part of a mile or minute in latitude.

TO FIND THE NUMBER FOR THE LATITUDE BY DEAD-RECKONING.

Example II. What is the number of the latitude 49 degrees 57 minutes dead-reckoning?

Under 49 degrees, and in the column under the first number, and against 57 minutes, stands 191481.

No. II. is to find the proportion of miles or minutes the dead-reckoning is in error, when the number wrought for does not correspond with the number given in the time-table, for the time the altitude is taken, which is done with the assistance of No. IV. as will be explained hereafter; No. III. is for the quotient and the excess.

Example III. What is the number for the quotient 79..43?

Under 79 degrees, and in the third column opposite 43 minutes is 9992967.

Example IV. What is the number for the quotient 79..43 and three-fourths, or 45 seconds?

Take the difference of the number for 79..44, and the number for 79..43, being the next number to it, which is 22, and divide it by 4, the quotient is 5 and one-half, which multiplied by 3, makes 16 nearest; add 16 to the number for 79..43 which is 9992967, and it will be 9992983, and so on for any other proportional part of a minute.

N. B. In the same manner, and in the same column, look for the number for the excess.

To

To find the proportion of miles according to any difference between the number wrought for and the number given :

Example V. With South declination in the latitude by dead-reckoning 49..53 north, the quotient 67..06, the excess 37..42, the difference between the number wrought and the number given when the altitude was taken being 384, the latitude being north, and the declination south, take the number in the second column under the latitude 49 degrees, and against 53 minutes, which is

	-	150
The number in the fourth column under the quotient 67 degrees, and	-	
against 6 minutes, is	-	26

Being added is	-	176
----------------	---	-----

From which subtract the fourth number found under 37 degrees, and	-	
against 42 minutes, the excess is	-	82

Divide the difference of the numbers when the altitude was taken	}	94)384(4
by the remainder 94		376
The quotient, which is four, is the error in the dead-reckoning.		8

Example VI. With north declination in the latitude by dead-reckoning 49..53 north, the quotient 79..45..40 or three-quarters of a minute, the excess 30..20..40 or three-quarters of a minute, the difference between the number wrought for and the number given when the altitude was taken being 126, the latitude and declination being of one name, add the fourth number for the quotient under 79 degrees, and against 45 minutes

PROBLEM THE FIRST.

On the 18th day of January, 1795, at 10 hours 1 minute A. M. being in the meridian of London, the ☉ declination was at that time 20..31 south, the latitude by dead-reckoning 49..57 north, ☉ altitude 14..46. the true latitude is required.

The declination being south and in north latitude

Add { the latitude by D. R.	-	-	-	49	57
and the altitude	-	-	-	14	46
Subtract the sum	-	-	-	64	43
From	-	-	-	270	00
				205	17
To which add the declination	-	-	-	20	31
Divide by	-	-	-	2)225	48
From the quotient	-	-	-	112	54
Subtract the Co. of the latitude	-	-	-	75	14
Gives the excess	-	-	-	37	40

N. B. The quotient 112..54 being more than 90..00, subtract it from 180..00, and take the remainder 67..06 for the quotient.

Take

Take the numbers for

The Declination under No. I.	-	20..31	-	28460
The Latitude under ditto	-	49..57	-	191481
The Quotient under No. III.	-	67..06	-	9964347
The Excess under ditto	-	37..40	-	9786089
				9970377

The sum is the number wrought for, and if the latitude by dead-reckoning be right, the number will correspond with the number given, for the time the altitude was taken, which is found in the same table over 10 hours against 1 minute in the right hand column to be

9970393
16

As the number wrought for is less than the number given, the error in dead-reckoning is to the southward 16..94 parts of a mile—To find which the declination and latitude being of different names,

Take the second number for the latitude by D. R.	46..57	150	} add them
The fourth number for the quotient	- 67..06	26	
		176	
Subtract the fourth number for the excess	- 37..40	82	

The proportion for one mile - - - 94 at the given time with the given declination and latitude. To find the error, divide 94 by 16, the remainder, which will give near one-sixth part of a mile.

PROBLEM THE SECOND.

On the 18th day of January 1795, at noon, being in the meridian of London, the ☉ declination was at that time 20..30 south, the latitude by dead-reckoning 49. 57 north, the ☉ altitude 19..33, the true latitude is required.

The declination being south and the latitude north

Add { the latitude	-	-	-	49	57
and the altitude	-	-	-	19	33
Subtract the sum	-	-	-	69	30
From	-	-	-	270	00
				230	30
To which add the declination	-	-	-	20	30
Divide by	-	-	-	2)221	00
From the quotient	-	-	-	110	30
Subtract the Co. of the latitude	-	-	-	70	27
Gives the excess	-	-	-	40	3

N. B. The quotient 110..30 being more than 90..00, subtract it from 180..00 and take the remainder 69..30 for the quotient.

Take

Take the numbers for

The ☉ declination under	No. I.	-	20..30	=	28412
The Latitude by D. R. under	ditto	-	49..57	-	191481
The Quotient under	No. III.	-	69..30	-	9971588
The Excess under	ditto	-	40..03	=	9808519

The latitude by dead-reckoning being right,

10000000

The sum of the numbers produceth nothing; but had it been one minute in error, the produce would have been 9999999.—See the Time-table.

PROBLEM THE THIRD.

On the 19th day of January, 1795, at one hour 59 minutes, P. M. being in the meridian of London, the ☉ declination was at that time 20..29 south, the latitude by dead-reckoning 49..57 north, the ☉ altitude 14..48 the true latitude is required.

The declination being south and the latitude north,

Add { the latitude by D. R.	-	-	49	57
and the altitude	-	-	14	48
Subtract the sum	-	-	64	45
From	-	-	270	00
To which	-	-	205	15
Add the declination	-	-	20	29
Divide by	-	-	2)125	44
From the quotient	-	-	112	52
Subtract the Co. of the altitude	-	-	75	12
Gives the excess	-	-	37	40

Take the number for

The Declination under	No. I.	-	20..29	-	28365
The Latitude by D. R. under	ditto	-	49..57	-	191481
The Quotient under	No. III.	-	67..08	-	9964454
The Excess under	ditto	-	37..40	-	9786089
					9970389

The sum is the number wrought for, and if the latitude by dead-reckoning is right, the number will correspond with the number given at the time the altitude was taken, which is found in the Time-table under 1 hour and against 59 minutes, in the left hand column, to be

9970393

4

The number wrought for being less than the number given at the time the altitude was taken, the error in the latitude by dead-reckoning is to the southward 4.94 parts of a mile.

PROBLEM THE FOURTH.

On the 19th day of January, 1795, at 1 hour 59 minutes, P. M. being in the meridian of London, the declination at that time 20..29 south, the latitude by dead-reckoning 50..01 north, the $\odot$ altitude 14..48, the true latitude is required.

The declination being south and the latitude north,

Add {	the latitude	-	-	-	50	1
	and the altitude	-	-	-	14	48
Subtract the sum	-	-	-	-	64	49
From	-	-	-	-	270	00
To which	-	-	-	-	205	11
Add the declination	-	-	-	-	20	29
Divide by	-	-	-	-	2)225	40
From the quotient	-	-	-	-	112	50
Subtract the Co. of the altitude	-	-	-	-	75	12
Gives the excess	-	-	-	-	37	38

Take the number for

The Declination under	No. I.	-	20..29	28365
The Latitude under	ditto	-	50..01	192083
The Quotient under	No. III.	-	67..10	9964560
The Excess under	ditto	-	37..38	9785761
				9970769

The sum or the number wrought for, shews that the latitude by dead-reckoning is to the northward of the true latitude, it being more than the number given for the time the altitude was taken, which is found in the Time-table under 1 hour and against 59 minutes, in the right hand column, to be

$$\begin{array}{r} 9970393 \\ \hline 376 \end{array}$$

To find the number of miles in error,

The declination and the latitude being of different names.

Add {	The second number for the latitude by D. R.	50..01	-	150
	The fourth number for the quotient	67..10	-	26
From which	-	-	-	176
Subtract the fourth number of the excess	-	37..38	-	82
				94

Divide the difference of the two numbers by the remainder, and the quotient is the miles of error in the latitude by dead-reckoning.

$$\begin{array}{r} 94)376(4 \text{ from the latitude by D. R.} \\ \underline{376} \end{array}$$

$$\dots \text{ subtract the quotient} \quad \begin{array}{r} - \\ \hline 00..04 \end{array}$$

$$\text{The true latitude is} \quad \begin{array}{r} - \\ \hline 49..57 \end{array}$$

PROBLEM

PROBLEM THE FIFTH.

On the 18th day of January, 1795, at 1 hour 59 minutes, P.M. being in the meridian of London, the $\odot$ declination was at that time 20..29 south, the latitude by dead-reckoning 49..53 north, the altitude 14..48. the true latitude is required.

Being south declination and north latitude

Add {	the latitude by D. R.	-	-	-	49	53
	and the altitude	-	-	-	14	48
Subtract the sum	-	-	-	-	64	41
From	-	-	-	-	270	00
To which	-	-	-	-	205	19
Add the declination	-	-	-	-	20	29
Divide by	-	-	-	-	2)225	48
From the quotient	-	-	-	-	112	54
Subtract the Co. of the altitude	-	-	-	-	75	12
Gives the excess	-	-	-	-	37	42

N. B. The quotient 112..54 being more than 90..00, subtract it from 180..00, and take the remainder 67..06 for the quotient.

Take the numbers for

The Declination under	No. I.	20..29	-	28365
The Latitude by D. R. under	ditto	49..53	-	190881
The Quotient under	No. III.	67..06	-	9964347
The Excess under	ditto	37..42	-	9786416
9970009				

The sum or the number wrought for sheweth, that latitude by dead-reckoning is to the southward of the true latitude, it being less than the number given for the time the altitude was taken, which is found in the Time table under 1 hour P. M. and against 59 minutes, in the left hand column, to be

9970393
384

To find the number of miles in error,

Add {	The second number for the latitude by D. R.	49..53	-	150
	The fourth number for the quotient	67..06	-	26
Subtract the fourth number for the excess	=	37..42	-	176
95				

Divide the difference of the two numbers 384 by the remainder 95, and the quotient is the miles of the error in the dead-reckoning.

95)384(4	to the latitude by D. R.	-	49..53
380			
4	add the quotient	=	00..04

The true latitude = = 49..57

PROBLEM

PROBLEM THE SIXTH.

On the 20th day of May, 1795, at 8 hours 40 minutes A. M. being in the meridian of London, the $\odot$ declination was at that time 20,00.00 north, or 20.00 and a half, the latitude by dead-reckoning 49.57 north, the altitude 40.30, the true latitude is required.

The declination and latitude being north

Add {	the declination	-	-	-	20	00 $\frac{1}{2}$
	the latitude by D. R.	-	-	-	49	57
	the altitude	-	-	-	40	35
Subtract the sum	-	-	-	-	110	32 $\frac{1}{2}$
From	-	-	-	-	270	00
Divide by	-	-	-	-	2)159	27 $\frac{1}{2}$
From the quotient	-	-	-	-	79	43 $\frac{3}{4}$
Subtract the Co. of the altitude	-	-	-	-	49	25
Gives the excess	-	-	-	-	30	18 $\frac{3}{4}$

Take the numbers for

The Declination under	No. I.	20.00 $\frac{1}{2}$	-	27037
The Latitude by D. R. under	ditto	49.57	-	191481
The Quotient under	No. III.	79.43 $\frac{3}{4}$	-	9992983
The Excess under	ditto	30.18 $\frac{3}{4}$	-	9703047
				9914548

The number wrought for to correspond with the number given for the time the altitude was taken, which is found in the Time-table over 8 hours against 40 minutes, in the left hand column, to be

9914552

4

The number wrought for being less than the number given, for the time the altitude was taken, the error in the latitude by dead-reckoning is to the southward 4.31 parts of a mile—To prove which the declination and latitude being north,

Add {	the fourth number for the quotient	79.43 $\frac{3}{4}$	-	11
	the fourth number for the excess	30.18 $\frac{3}{4}$	-	108
Subtract the sum	-	-	-	119
From the second number for the latitude	49.57	-	-	150
				31

The proportion for a mile in that latitude, and declination at that hour of the day is 31, which divided by 4, the difference of the number wrought for and the number given, the quotient is 8 nearest, which is the eighth part of a mile in error in the latitude by dead-reckoning.

PROBLEM THE SEVENTH.

On the 20th day of May, 1795, at noon, being in the meridian of London, the ☉ declination 20..02 north, the latitude by dead-reckoning 49..57 north, the altitude 60..05, the true latitude is required.

The latitude and declination being north,

Add {	the declination	-	-	-	20	02
	the latitude	-	-	-	49	57
	the altitude	-	-	-	60	05
Subtract the sum						130 04
From						270 00
Divide by						2)139 56
From the quotient						69 58
Subtract the Co. of the altitude by D. R.						29 55
Gives the excess						40 03

Take the numbers for

The Declination under	No. I.	20..02	-	27106
The Latitude by D. R. under	ditto	49..57	-	191481
The Quotient under	No. IV.	69..58	-	9972894
The Excess under	ditto	40..03	-	9808519

The number wrought for being - - - 0000000

is a proof that the latitude by dead-reckoning is right, as the number in the Time-table at noon, is 0000000.

PROBLEM THE EIGHTH.

On the 21st day of May, 1795, at 3 hours 20 minutes, P. M. being in the meridian of London, the ☉ declination was 20..03..40 north, or two-thirds of a minute, the latitude by dead-reckoning 49..57 north, the altitude 40..37..20 or one third of a minute, the true latitude is required.

The declination and latitude being north,

Add {	the declination	-	-	-	20	03 $\frac{2}{3}$
	the latitude by D. R.	-	-	-	49	57
	the altitude	-	-	-	40	37 $\frac{1}{3}$
Subtract the sum						110 38
From						270 00
Divide by						2)159 22
From the quotient						79 41
Subtract the Co. of the altitude						49 22 $\frac{2}{3}$
Gives the excess						30 18 $\frac{1}{3}$

Q

Take

Take the numbers for

The Declination under	No. I.	20..03 $\frac{1}{2}$	-	27182
The Latitude by D. R. under	ditto	49..57	-	191481
The Quotient under	No. IV.	79..41	-	9992921
The Excess under	ditto	30..18 $\frac{1}{2}$	-	9702957
				9914541
The number wrought for to correspond with the number given at the time the altitude was taken, which is found in the Time-table under 3 hours, P. M. and against 20 minutes, in the right hand column, to be				
				9914552
				11

The number wrought for being less than the number given, the error in the dead-reckoning is to the southward one-third part of a mile; to prove which, the declination and latitude being north,

Add {	the fourth number for the quotient	79..41	-	11
	the fourth number for the excess	30..18 $\frac{1}{2}$	-	108
Subtract the sum	-	-	-	119
From the second number for the latitude	49..57	-	-	150
				31

The proportion for one mile for that latitude, declination, and hour of the day is 31, which divided by 11, the quotient is nearest 3, which is one-third of a mile, the error in dead-reckoning.

PROBLEM THE NINTH.

On the 20th day of May, 1795, at 8 hours 40 minutes, A. M. being in the meridian of London, the $\odot$ declination was 20..00..30 north, or one-half of a minute, the latitude by dead-reckoning 50..01 north, the altitude 40..35, the true latitude is required.

The declination and latitude being north,

Add {	the declination	-	-	-	20	00 $\frac{1}{2}$
	the latitude by D. R.	-	-	-	50	01
	the altitude	-	-	-	40	35
Subtract the sum	-	-	-	-	110	36 $\frac{1}{2}$
From	-	-	-	-	270	0
Divide by	-	-	-	-	2)159	23 $\frac{1}{2}$
From the quotient	-	-	-	-	79	41 $\frac{3}{4}$
Subtract the Co. of the altitude	-	-	-	-	49	25
Gives the excess	-	-	-	-	30	16 $\frac{1}{4}$

Take

Take the numbers for

The Declination under	No. I.	-	20..00 $\frac{1}{2}$	-	27037
The Latitude by D. R. under	ditto	-	50..01 $\frac{1}{2}$	-	192083
The Quotient under	No. IV.	-	79..41 $\frac{1}{2}$	-	9992937
The Excess under	ditto	-	30..16 $\frac{1}{2}$	-	9702614
					<u>9914671</u>

The number wrought for corresponds with the number given for the time the altitude was taken, which is found in the Time-table over 8 hours and against 40 minutes, in the right hand column, to be

9914552

119

The number wrought for being more than the number given for the time the altitude was taken, the error in latitude by dead-reckoning is to the northward—To find the proportion of miles in error,

The declination and latitude by dead-reckoning being north,

Add {	The fourth number of the quotient	-	79..41 $\frac{1}{2}$	-	11
	The fourth number of the excess	-	30..16 $\frac{1}{2}$	-	108
					<u>119</u>
Subtract the sum	-	-	-	-	119
From the second number of the latitude by D. R.	50..01	-	151	-	<u>32</u>

The proportion for one mile in that latitude and declination, and time of the day, is 32, by which divide the difference of the number wrought for and the number given, for the time the altitude was taken 119, the quotient is nearest 4 miles, the error in latitude by dead-reckoning, which 4 miles subtract from 50..01, the latitude by dead-reckoning is 49..57, the true latitude.

PROBLEM THE TENTH.

On the 21st day of May, 1795, at 8 hours 40 minutes, A.M. being in the meridian of London, the $\odot$ declination was 20..00 $\frac{1}{2}$ north, the latitude by dead-reckoning 49..53, the altitude 40..35, the true latitude is required.

The declination and latitude being north,

Add {	the declination	-	-	-	20	00 $\frac{1}{2}$
	the latitude	-	-	-	49	53
	the altitude	-	-	-	40	35
					<u>110</u>	28 $\frac{1}{2}$
Subtract the sum	-	-	-	-	270	00
From	-	-	-	-	<u>2)159</u>	31 $\frac{1}{2}$
Divide by	-	-	-	-	79	45 $\frac{1}{2}$
From the quotient	-	-	-	-	49	25
Subtract the Co. of the altitude	-	-	-	-	<u>30</u>	20 $\frac{1}{2}$
Gives the excess	-	-	-	-		

Take

Take the numbers for

The Declination under	No. I.	20.001	-	27037
The Latitude by D. R. under	ditto	49.53	-	190881
The Quotient under	No. III.	79.451	-	9993029
The Excess under	ditto	30.201	-	9703479

9914426

The number wrought for to correspond with the number given for the time the altitude was taken, which is found in the Time-table over 8 hours, A. M. and against 40 minutes, in the right hand column, to be

9914552

126

The number wrought for being less than the number given, the error in latitude by dead-reckoning is to the southward.

To find the proportion of miles in error,

The declination and latitude by dead-reckoning being north,

Add {	The fourth number for the quotient	79.451	-	11
	And the fourth number for the excess	30.201	-	108

Subtract the sum

119

From the second number of the latitude by D. R.

150

31

The proportion for one mile in that declination and latitude and time of the day is 31, by which divide the difference of the number wrought for and the number given, for the time the altitude was taken 126, the quotient 4 is the number of miles in error; to the latitude by dead-reckoning 49.53, add the 4 miles, and the true latitude is 49.57.

F I N I S.

In finding the latitude by a single altitude, before or after the meridian, the time of the day being necessary, when the altitude is taken and not always the case that the watch or watches keep exact time, to regulate which, exclusive of the sun rising or setting, it is to be done by a single altitude, if the true latitude is known.

In working the problems for the time of the day, when the latitude is known, is the same as working for the latitude; when the time is known, the number wrought for is the time of the day which is found in the time table.

When the meridian altitude is taken, the latitude then is found without the assistance of a watch, from which time take good notice what the ship sails in distance, and on what course, for two or three hours or more; when a good opportunity, take the altitude of the sun, and take notice at what hour by the watch; then turn to the log-book, and according to the course and distance, find the difference of latitude by the tables of difference of latitude and departure; if nothing in north latitude, add to the latitude by the meridian altitude; if southing, subtract gives the latitude; if in south latitude, the difference of latitude from the meridian is north subtract; if south, add to the meridian latitude; then work the problem as before, and with the number wrought for, enter the time table for the time of the day. If the number wrought for does not exactly correspond with any number in the time table, take the nearest above and below the number wrought for, subtract the one from the other, and with the remainder and the difference between the number wrought for and the next number to it for the odd seconds, find by the rule of three, say if the difference between the two numbers give one minute or 60 seconds, what will the difference between the number wrought for and the nearest number to it give, the answer is the odd seconds.

After proving a watch three or four days, it will be known what it will lose or gain in 24 hours, by which it can be proportioned for less or more hours. When such opportunities cannot be had to prove it, by care a good common watch may answer the purpose, but a watch with a second hand is more suitable.

altitude, then must it be added to the given altitude, and the index set to the same.

[illegible]

In the columns under F. I. is the height of the eye above the surface, and under M. S. is the minutes and seconds of dip or depression of the visible horizon.

A Table of refraction, to be used in the same manner as above, as the depression of the horizon and the refraction both add to the apparent altitude.

App. Alt.	Retrac- tion.	App. Alt.	Retrac- tion.	App. Alt.	Retrac- tion.	App. Alt.	Retrac- tion.	App. Alt.	Retrac- tion.	App. Alt.	Retrac- tion.	App. Alt.	Retrac- tion.	App. Alt.	Retrac- tion.		
Deg.	M. S.	Deg.	M. S.	Deg.	M. S.	Deg.	M. S.	Deg.	M. S.	Deg.	M. S.	Deg.	M. S.	Deg.	M. S.		
0 $\frac{1}{2}$ 1 $1\frac{1}{2}$ 2 $2\frac{1}{2}$ 3 $3\frac{1}{2}$ 4 $4\frac{1}{2}$ 5 6	33 28 22 29 15 35 24 36 34 31 28	7 8 9 10 11 12 13 14 15 16 17 18	7 6 5 5 4 4 4 3 3 3 2	20 29 48 15 47 23 24 3 45 30 17 4 54	19 20 21 22 23 24 25 26 27 28 29 30	2 2 2 2 2 2 2 2 1 1 1 1 1 1	44 35 27 20 14 7 2 56 51 47 42 38	31 32 33 34 35 36 37 38 39 40 41 42	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	43 44 45 46 47 48 49 50 51 52 53 54	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	55 56 57 58 59 60 61 62 63 64 65 66	40 38 36 35 34 33 31 30 29 28 26 25	67 68 69 70 71 72 73 74 75 76 77 78	24 23 22 21 19 18 17 16 15 14 13 12	79 80 81 82 83 84 85 86 87 88 89 90	11 10 9 8 7 6 5 4 3 2 1 0

(A)

LATITUDE 1 DEGREE.										LATITUDE 2 DEGREES.											
NORTH.					DECLINATION.					NORTH.					DECLINATION.						
					SOUTH.										SOUTH.						
D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	D. M.		
0	6	E.	N	W.	6	E.	S	W.	6	0	6	E.	N	W.	6	E.	S	W.	6		
1	6		01		6		01		6	1	6		01		6		01		6		
2	6		02		6		02		6	2	6		02		6		02		6		
3	6		03		6		03		6	3	6		03		6		03		6		
4	6		04		6		04		6	4	6		04		6		04		6		
5	6		05		6		05		6	5	6		05		6		05		6		
6	6		06		6		06		6	6	5	59	06	01	6	01	06		5	59	
7	6		07		6		07		6	7	5	59	07	01	6	01	07		5	59	
8	6		08		6		08		6	8	5	59	08	01	6	01	08		5	59	
9	5	59	09		6	01	09		5	59	9	5	59	09	01	6	01	09		5	59
10	5	59	10		6	01	10		5	59	10	5	59	10	01	6	01	10		5	59
11	5	59	11	15	6	01	11	15	5	59	11	5	59	11	01	11	15	11	15	5	59
12	5	59	12	is Eb N	6	01	12	is Wb S	5	59	12	5	58	12	02	12	is Eb S	12	is Wb S	5	58
13	5	59	13		6	01	13		5	59	13	5	58	13	02	13		13		5	58
14	5	59	14		6	01	14		5	59	14	5	58	14	02	14		14		5	58
15	5	59	15		6	01	15		5	59	15	5	58	15	02	15		15		5	58
16	5	59	16		6	01	16		5	59	16	5	58	16	02	16	01	16	01	5	58
17	5	59	17		6	01	17		5	59	17	5	58	17	02	17	01	17	01	5	58
18	5	59	18		6	01	18		5	59	18	5	58	18	02	18	01	18	01	5	58
19	5	59	19		6	01	19		5	59	19	5	57	19	03	19	01	19	01	5	57
20	5	59	20		6	01	20		5	59	20	5	57	20	03	20	01	20	01	5	57
21	5	59	21		6	01	21		5	59	21	5	57	21	03	21	01	21	01	5	57
22	5	58	22	30	6	02	22	30	5	58	22	5	57	22	03	22	01	22	30	5	57
23	5	58	23	is ENE	6	02	23	is ESE	5	58	23	5	57	23	03	23	01	23	is WSW	5	57
23	28	5	23		6	02	23		5	58	23	28	5	56	23	04	23	01	23	5	56

LATITUDE 3 DEGREES.										LATITUDE 4 DEGREES.											
NORTH					DECLINATION.					NORTH.					DECLINATION.						
					SOUTH.										SOUTH.						
D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.		
0	6	E.	N	W.	6	E.	S	W.	6	0	6	E.	N	W.	6	E.	S		6		
1	6		01		6		01		6	1	6		01		6		01		6		
2	6		02		6		02		6	2	6		02		6		02		6		
3	5	59	03		6	01	03		5	59	3	5	59	03	01	6	01	03	5	59	
4	5	59	04		6	01	04		5	59	4	5	59	04	01	6	01	04	5	59	
5	5	59	05		6	01	05		5	59	5	5	59	05	01	6	01	05	5	59	
6	5	59	06		6	01	06		5	59	6	5	58	06	02	6	02	06	5	58	
7	5	59	07		6	01	07		5	59	7	5	58	07	02	6	02	07	5	58	
8	5	58	08	01	6	02	08	01	5	58	8	5	58	08	02	6	02	08	5	58	
9	5	58	09	01	6	02	09	01	5	58	9	5	57	09	03	6	03	09	5	57	
10	5	58	10	01	6	02	10	01	5	58	10	5	57	10	03	6	03	10	5	57	
11	5	58	11	15	6	02	11	15	5	58	11	5	57	11	03	11	15	11	15	5	57
12	5	58	12	is Eb N	6	02	12	is Wb S	5	58	12	5	57	12	03	12	is Eb S	12	is Wb S	5	57
13	5	57	13	01	6	03	13	01	5	57	13	5	56	13	04	13	01	13	01	5	56
14	5	57	14	01	6	03	14	01	5	57	14	5	56	14	04	14	01	14	01	5	56
15	5	57	15	01	6	03	15	01	5	57	15	5	56	15	04	15	02	15	02	5	56
16	5	57	16	01	6	03	16	01	5	57	16	5	55	16	05	16	02	16	02	5	55
17	5	56	17	01	6	04	17	01	5	56	17	5	55	17	05	17	02	17	02	5	55
18	5	56	18	01	6	04	18	01	5	56	18	5	55	18	05	18	02	18	02	5	55
19	5	56	19	01	6	04	19	01	5	56	19	5	55	19	05	19	02	19	02	5	55
20	5	56	20	02	6	04	20	02	5	56	20	5	54	20	06	20	03	20	03	5	54
21	5	55	21	02	6	05	21	02	5	55	21	5	54	21	06	21	03	21	03	5	54
22	5	55	22	30	6	05	22	30	5	55	22	5	54	22	06	22	30	22	30	5	54
23	5	55	23	is ENE	6	05	23	is ESE	5	55	23	5	53	23	07	23	is ESE	23	is WSW	5	53
23	28	5	23	29	6	05	23	29	5	55	23	28	5	53	23	07	23	30	23	5	53

(B)

LATITUDE 5 DEGREES.										LATITUDE 6 DEGREES.									
NORTH.					DECLINATION.					NORTH.					DECLINATION.				
					SOUTH.														
D. M.	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	D. M.	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	☉ Rises	D. M.	☉ Sets	H. M.
0	6	E.	—	N—	W.	6	—	E.	—	S.—	W.	6	—	E.	—	N—	W.	6	—
1	6	—	01	—	6	—	01	—	6	—	1	6	—	01	—	01	—	6	—
2	5	59	02	—	6	01	02	—	5	59	2	5	59	02	—	02	—	5	59
3	5	59	03	—	6	01	03	—	5	59	3	5	59	03	01	03	01	5	59
4	5	59	04	01	6	01	04	01	5	59	4	5	58	04	01	04	01	5	58
5	5	58	05	01	6	02	05	01	5	58	5	5	58	05	01	05	01	5	58
6	5	58	06	01	6	02	06	01	5	58	6	5	57	06	02	06	02	5	57
7	5	58	07	01	6	02	07	01	5	58	7	5	57	07	02	07	02	5	57
8	5	57	08	02	6	03	08	02	5	57	8	5	57	08	02	08	02	5	57
9	5	57	09	02	6	03	09	02	5	57	9	5	56	09	02	09	02	5	56
10	5	56	10	02	6	04	10	02	5	56	10	5	56	10	03	10	03	5	56
11	3	56	11	02	6	04	11	02	5	56	11	5	55	11	03	11	03	5	55
12	5	56	12	03	6	04	12	03	5	56	12	5	55	12	04	12	04	5	55
13	5	55	13	03	6	05	13	03	5	55	13	5	54	13	04	13	04	5	54
14	5	55	14	03	6	05	14	03	5	55	14	5	54	14	04	14	04	5	54
15	5	55	15	03	6	05	15	03	5	55	15	5	54	15	05	15	05	5	54
16	5	54	16	04	6	06	16	04	5	54	16	5	53	16	05	16	05	5	53
17	5	54	17	04	6	06	17	04	5	54	17	5	53	17	05	17	05	5	53
18	5	53	18	04	6	07	18	04	5	53	18	5	52	18	06	18	06	5	52
19	5	53	19	04	6	07	19	04	5	53	19	5	52	19	06	19	06	5	52
20	5	53	20	05	6	07	20	05	5	53	20	5	51	20	06	20	06	5	51
21	5	52	21	05	6	08	21	05	5	52	21	5	51	21	07	21	07	5	51
22	5	52	22	05	6	08	22	05	5	52	22	5	50	22	07	22	07	5	50
23	5	51	23	05	6	09	23	05	5	51	23	5	50	23	07	23	07	5	50
23	28	51	23	32	6	09	23	32	5	51	23	28	49	23	36	23	36	5	49

LATITUDE 7 DEGREES.										LATITUDE 8 DEGREES.									
NORTH.					DECLINATION.					NORTH.					DECLINATION.				
					SOUTH.														
D. M.	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	D. M.	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	☉ Rises	D. M.	☉ Sets	H. M.
0	6	E.	—	N—	W.	6	—	E.	—	S.—	W.	6	—	E.	—	N—	W.	6	—
1	6	—	01	—	6	—	01	—	6	—	1	6	—	01	—	01	—	6	—
2	5	59	02	01	6	01	02	01	5	59	2	5	59	02	01	02	01	5	59
3	5	59	03	01	6	01	03	01	5	59	3	5	58	03	01	03	01	5	58
4	5	58	04	02	6	02	04	02	5	58	4	5	58	04	02	04	02	5	58
5	5	58	05	02	6	02	05	02	5	58	5	5	57	05	02	05	02	5	57
6	5	57	06	02	6	03	06	02	5	57	6	5	57	06	03	06	03	5	57
7	5	57	07	03	6	03	07	03	5	57	7	5	56	07	04	07	04	5	56
8	5	56	08	03	6	04	08	03	5	56	8	5	56	08	04	08	04	5	56
9	5	56	09	04	6	04	09	04	5	56	9	5	55	09	05	09	05	5	55
10	5	55	10	04	6	05	10	04	5	55	10	5	54	10	06	10	06	5	54
11	5	55	11	05	6	05	11	05	5	55	11	5	54	11	06	11	06	5	54
12	5	54	12	05	6	06	12	05	5	54	12	5	53	12	07	12	07	5	53
13	5	54	13	06	6	06	13	06	5	54	13	5	53	13	08	13	08	5	53
14	5	53	14	06	6	07	14	06	5	53	14	5	52	14	08	14	08	5	52
15	5	52	15	07	6	08	15	07	5	52	15	5	51	15	09	15	09	5	51
16	5	52	16	07	6	08	16	07	5	52	16	5	51	16	10	16	10	5	51
17	5	51	17	08	6	09	17	08	5	51	17	5	50	17	10	17	10	5	50
18	5	51	18	08	6	09	18	08	5	51	18	5	50	18	11	18	11	5	50
19	5	50	19	09	6	10	19	09	5	50	19	5	49	19	12	19	12	5	49
20	5	50	20	09	6	10	20	09	5	50	20	5	48	20	12	20	12	5	48
21	5	49	21	10	6	11	21	10	5	49	21	5	48	21	13	21	12	5	48
22	5	49	22	10	6	11	22	10	5	49	22	5	47	22	13	22	13	5	47
23	5	48	23	11	6	12	23	11	5	48	23	5	46	23	14	23	14	5	46
23	28	48	23	39	6	12	23	39	5	48	23	28	46	23	43	23	43	5	46

(C)

LATITUDE 9 DEGREES.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	N	W.	6	E.	S.	W.	6
1	5	59	01		6	01	01		5
2	5	59	02	01	6	01	02	01	5
3	5	58	03	01	6	02	03	01	5
4	5	58	04	02	6	02	04	02	5
5	5	57	05	03	6	03	05	03	5
6	5	56	06	04	6	04	06	04	5
7	5	56	07	05	6	04	07	05	5
8	5	55	08	06	6	05	08	06	5
9	5	54	09	06	6	06	09	06	5
10	5	54	10	07	6	06	10	07	5
11	5	53	11	08	6	07	11	08	5
12	5	52	12	09	6	08	12	09	5
13	5	52	13	09	6	08	13	09	5
14	5	51	14	10	6	09	14	10	5
15	5	50	15	11	6	10	15	11	5
16	5	50	16	12	6	10	16	12	5
17	5	49	17	13	6	11	17	13	5
18	5	48	18	14	6	12	18	14	5
19	5	47	19	15	6	13	19	15	5
20	5	46	20	16	6	14	20	16	5
21	5	46	21	17	6	14	21	17	5
22	5	45	22	18	6	15	22	18	5
23	5	45	23	19	6	15	23	19	5
23	28	44	23	46	6	16	23	46	5

LATITUDE 10 DEGREES.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	N	W.	6	E.	S.	W.	6
1	5	59	01	01	6	01	01	01	5
2	5	59	02	02	6	01	02	02	5
3	5	58	03	03	6	02	03	03	5
4	5	57	04	04	6	03	04	04	5
5	5	56	05	05	6	04	05	05	5
6	5	56	06	06	6	04	06	06	5
7	5	55	07	07	6	05	07	07	5
8	5	54	08	08	6	06	08	08	5
9	5	54	09	09	6	06	09	09	5
10	5	53	10	10	6	07	10	10	5
11	5	52	11	11	6	08	11	11	5
12	5	51	12	12	6	09	12	12	5
13	5	51	13	13	6	09	13	13	5
14	5	50	14	14	6	10	14	14	5
15	5	49	15	15	6	11	15	15	5
16	5	48	16	16	6	12	16	16	5
17	5	48	17	17	6	12	17	17	5
18	5	47	18	18	6	13	18	18	5
19	5	46	19	19	6	14	19	19	5
20	5	45	20	20	6	15	20	20	5
21	5	44	21	21	6	16	21	21	5
22	5	44	22	22	6	16	22	22	5
23	5	43	23	23	6	17	23	23	5
23	28	43	23	49	6	17	23	49	5

LATITUDE 11 DEGREES.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	N	W.	6	E.	S.	W.	6
1	5	59	01	01	6	01	01	01	5
2	5	58	02	02	6	02	02	02	5
3	5	58	03	03	6	02	03	03	5
4	5	57	04	04	6	03	04	04	5
5	5	56	05	05	6	04	05	05	5
6	5	55	06	06	6	05	06	06	5
7	5	55	07	08	6	05	07	08	5
8	5	54	08	09	6	06	08	09	5
9	5	53	09	10	6	07	09	10	5
10	5	52	10	11	6	08	10	11	5
11	5	51	11	13	6	09	11	13	5
12	5	51	12	14	6	09	12	14	5
13	5	50	13	15	6	10	13	15	5
14	5	49	14	16	6	11	14	16	5
15	5	48	15	17	6	12	15	17	5
16	5	47	16	19	6	13	16	19	5
17	5	46	17	20	6	14	17	20	5
18	5	45	18	21	6	14	18	21	5
19	5	45	19	22	6	15	19	22	5
20	5	44	20	24	6	16	20	24	5
21	5	44	21	25	6	17	21	25	5
22	5	43	22	27	6	18	22	27	5
23	5	41	23	28	6	19	23	28	5
23	28	41	23	56	6	19	23	56	5

LATITUDE 12 DEGREES.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	N	W.	6	E.	S.	W.	6
1	5	59	01	01	6	01	01	01	5
2	5	58	02	03	6	02	02	03	5
3	5	57	03	04	6	03	03	04	5
4	5	56	04	05	6	04	04	05	5
5	5	56	05	07	6	04	05	07	5
6	5	55	06	08	6	05	06	08	5
7	5	54	07	09	6	06	07	09	5
8	5	53	08	11	6	07	08	11	5
9	5	52	09	12	6	08	09	12	5
10	5	51	10	13	6	09	10	13	5
11	5	51	11	15	6	09	11	15	5
12	5	50	12	16	6	10	12	16	5
13	5	49	13	17	6	11	13	17	5
14	5	48	14	19	6	12	14	19	5
15	5	47	15	20	6	13	15	20	5
16	5	46	16	22	6	14	16	22	5
17	5	45	17	23	6	15	17	23	5
18	5	44	18	25	6	16	18	25	5
19	5	43	19	26	6	17	19	26	5
20	5	42	20	28	6	18	20	28	5
21	5	41	21	29	6	19	21	29	5
22	5	40	22	31	6	20	22	31	5
23	5	39	23	33	6	21	23	33	5
23	28	39	23	56	6	21	23	56	5

(D)

LATITUDE 13 DEGREES.												LATITUDE 14 DEGREES.																		
NORTH.				DECLINATION.				SOUTH.				NORTH.				DECLINATION.				SOUTH.										
D. M.	H. M.	⊙	Rises	D. M.	⊙	Sets	H. M.	⊙	Rises	D. M.	⊙	Sets	H. M.	D. M.	H. M.	⊙	Rises	D. M.	⊙	Sets	H. M.	⊙	Rises	D. M.	⊙	Sets	H. M.			
0	6	—	E.	—	N.	—	W.	6	—	E.	—	S.	—	W.	6	—	E.	—	N.	—	W.	6	—	E.	—	S.	—	W.	6	—
1	5	59		01	02		6	01		01	02		5	59	1	5	59		01	02		6	01		01	02		5	59	
2	5	58		02	03		6	02		02	03		5	58	2	5	58		02	04		6	02		02	04		5	58	
3	5	57		03	05		6	03		03	05		5	57	3	5	57		03	05		6	03		03	05		5	57	
4	5	56		04	06		6	04		04	06		5	56	4	5	56		04	07		6	04		04	07		5	56	
5	5	55		05	08		6	05		05	08		5	55	5	5	55		05	09		6	05		05	09		5	55	
6	5	54		06	10		6	06		06	10		5	54	6	5	54		06	11		6	06		06	11		5	54	
7	5	54		07	11		6	06		07	11		5	54	7	5	53		07	13		6	07		07	13		5	53	
8	5	53		08	13		6	07		08	13		5	53	8	5	52		08	15		6	08		08	15		5	52	
9	5	52		09	14		6	08		09	14		5	52	9	5	51		09	17		6	09		09	17		5	51	
10	5	51	11 15	10	16	11 15	6	09	11 15	10	16	11 15	5	51	10	5	50	11 15	10	19	11 15	6	10	11 15	10	19	11 15	5	50	
11	5	50	is EbN	11	17	is WbN	6	10	is EbS	11	17	is WbS	5	50	11	5	49	is EbN	11	20	is WbN	6	11	is EbS	11	20	is WbS	5	49	
12	5	49		12	19		6	11		12	19		5	49	12	5	48		12	22		6	12		12	22		5	48	
13	5	48		13	20		6	12		13	20		5	48	13	5	47		13	24		6	13		13	24		5	47	
14	5	47		14	22		6	13		14	22		5	47	14	5	46		14	26		6	14		14	26		5	46	
15	5	46		15	24		6	14		15	24		5	46	15	5	45		15	28		6	15		15	28		5	45	
16	5	45		16	26		6	15		16	26		5	45	16	5	44		16	30		6	16		16	30		5	44	
17	5	44		17	28		6	16		17	28		5	44	17	5	43		17	32		6	17		17	32		5	43	
18	5	43		18	30		6	17		18	30		5	43	18	5	41		18	34		6	19		18	34		5	41	
19	5	42		19	31		6	18		19	31		5	42	19	5	40		19	36		6	20		19	36		5	40	
20	5	41		20	33		6	19		20	33		5	41	20	5	39		20	38		6	21		20	38		5	39	
21	5	40	22 30	21	35	22 30	6	20	22 30	21	35	22 30	5	40	21	5	38	22 30	21	40	22 30	6	22	22 30	21	40	22 30	5	38	
22	5	39	is ENE	22	37	is WNW	6	21	is ESE	22	37	is WSW	5	39	22	5	37	is ENE	22	43	is WNW	6	23	is ESE	22	43	is WSW	5	37	
23	5	38		23	39		6	22		23	39		5	38	23	5	36		23	45		6	24		23	45		5	36	
23	28	5	37	24	09		6	23		24	09		5	37	23	28	5	35		24	14		6	25		24	14		5	35

LATITUDE 15 DEGREES.										LATITUDE 16 DEGREES.																							
NORTH.					DECLINATION.					NORTH.					DECLINATION.					SOUTH.													
D. M.	H. M.	⊙	Rises	D. M.	⊙	Sets	H. M.	⊙	Rises	D. M.	⊙	Sets	H. M.	D. M.	H. M.	⊙	Rises	D. M.	⊙	Sets	H. M.	D. M.	⊙	Sets	H. M.								
0	6	—	E.	—	N.	—	W.	6	—	E.	—	S.	—	W.	6	—	E.	—	N.	—	W.	6	—	E.	—	S.	—	W.	6	—			
1	5	59		01	02		6	01	01	02		5	59	1	5	59		01	02		6	01	01	02		5	59		5	59			
2	5	58		02	04		6	02	02	04		5	58	2	5	58		02	05		6	02	02	05		5	58		5	58			
3	5	57		03	06		6	03	03	06		5	57	3	5	57		03	07		6	03	03	07		5	57		5	57			
4	5	56		04	08		6	04	04	08		5	56	4	5	55		04	10		6	05	04	10		5	55		5	55			
5	5	55		05	10		6	05	05	10		5	55	5	5	54		05	12		6	06	05	12		5	54		5	54			
6	5	54		06	13		6	06	06	13		5	54	6	5	53		06	15		6	07	06	15		5	53		5	53			
7	5	53		07	15		6	07	07	15		5	53	7	5	52		07	17		6	08	07	17		5	52		5	52			
8	5	51		08	17		6	09	08	17		5	51	8	5	51		08	19		6	09	08	19		5	51		5	51			
9	5	50		09	19		6	10	09	19		5	50	9	5	50		09	21		6	10	09	21		5	50		5	50			
10	5	49	11 15	10	21	11 15	6	11	11 15	10	21	11 15	5	49	10	5	48	11 15	10	24	11 15	6	12	11 15	10	24	11 15	5	48		5	48	
11	5	48	is EbN	11	23	is WbN	6	12	is EbS	11	23	is WbS	5	48	11	5	47	is EbN	11	27	is WbN	6	13	is EbS	11	27	is WbS	5	47		5	47	
12	5	47		12	25		6	13		12	25		5	47	12	5	46		12	29		6	14		12	29		5	46		5	46	
13	5	46		13	27		6	14		13	27		5	46	13	5	45		13	32		6	15		13	32		5	45		5	45	
14	5	45		14	30		6	15		14	30		5	45	14	5	44		14	34		6	16		14	34		5	44		5	44	
15	5	44		15	32		6	16		15	32		5	44	15	5	42		15	37		6	18		15	37		5	42		5	42	
16	5	42		16	35		6	18		16	35		5	42	16	5	41		16	40		6	19		16	40		5	41		5	41	
17	5	41		17	37		6	19		17	37		5	41	17	5	40		17	42		6	20		17	42		5	40		5	40	
18	5	40		18	39		6	20		18	39		5	40	18	5	39		18	45		6	21		18	45		5	39		5	39	
19	5	39		19	42		6	21		19	42		5	39	19	5	37		19	48		6	23		19	48		5	37		5	37	
20	5	38		20	44		6	22		20	44		5	38	20	5	36		20	51		6	24		20	51		5	36		5	36	
21	5	36	22 30	21	46	22 30	6	24	22 30	21	46	22 30	5	36	21	5	35	22 30	21	53	22 30	6	25	22 30	21	53	22 30	5	35		5	35	
22	5	35	is ENE	22	49	is WNW	6	25	is ESE	22	49	is WSW	5	35	22	5	33	is ENE	22	56	is WNW	6	27	is ESE	22	56	is WSW	5	33		5	33	
23	5	34		23	51		6	26		23	51		5	34	23	5	32		23	58		6	28		23	58		5	32		5	32	
23	28	5	33	24	21		6	27		24	21		5	33	23	28	5	31		24	28		6	29		24	28		5	31		5	31

(E)

LATITUDE 17 DEGREE.

LATITUDE 18 DEGREES.

NORTH.

DECLINATION.

SOUTH.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	D. M.	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	D. M.	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	☉ Rif	D. M.	☉ Sets	D. M.			
0	6	—	E.	—	N	—	W.	6	—	E.	—	S	—	W.	6	—	E.	—	N	—	W.	6	—	E.	—	S	—	W.	6	—		
1	5	59			01	02			6	01		01	02		5	59			01	03		6	01		01	03			5	59		
2	5	58			02	05			6	02		02	05		5	58			02	06		6	02		02	06			5	58		
3	5	56			03	08			6	04		03	08		5	56			03	09		6	04		03	09			5	56		
4	5	55			04	11			6	05		04	11		5	55			04	12		6	05		04	12			5	55		
5	5	54			05	13			6	06		05	13		5	54			05	15		6	06		05	15			5	54		
6	5	53			06	17			6	07		06	17		5	53			06	19		6	08		06	19			5	52		
7	5	51			07	19			6	09		07	19		5	51			07	22		6	09		07	22			5	51		
8	5	50			08	22			6	10		08	22		5	50			08	25		6	10		08	25			5	50		
9	5	49			09	25			6	11		09	25		5	49			09	28		6	12		09	28			5	48		
10	5	48	11 15		10	28	11 15		6	12	11 15	10	28	11 15	5	48	10	5	47	11 15		10	31	11 15	6	13	11 15	10	31	11 15	5	47
11	5	47	is Eb N		11	30	is Wb N		6	13	is Eb S	11	30	is Wb S	5	47	11	5	46	is Eb N		11	34	is Wb N	6	14	is Eb S	11	34	is Wb S	5	46
12	5	46			12	33			6	14		12	33		5	46	12	5	44			12	38		6	16		12	38		5	34
13	5	44			13	36			6	16		13	36		5	44	13	5	43			13	41		6	17		13	41		5	43
14	5	43			14	39			6	17		14	39		5	43	14	5	41			14	44		6	19		14	44		5	41
15	5	41			15	42			6	19		15	42		5	41	15	5	40			15	47		6	20		15	47		5	40
16	5	40			16	45			6	20		16	45		5	40	16	5	39			16	51		6	21		16	51		5	39
17	5	39			17	48			6	21		17	48		5	39	17	5	38			17	54		6	22		17	54		5	38
18	5	38			18	51			6	22		18	51		5	38	18	5	36			18	58		6	24		18	58		5	36
19	5	36			19	54			6	24		19	54		5	36	19	5	34			20	01		6	26		20	01		5	34
20	5	35			20	57			6	25		20	57		5	35	20	5	33			21	04		6	27		21	04		5	33
21	5	33	22 30		22	00	22 30		6	27	22 30	22	00	22 30	5	33	21	5	31	22 30		22	08	22 30	6	29	22 30	22	08	22 30	5	31
22	5	32	is ENE		23	04	is WNW		6	28	is ESE	23	04	is WSW	5	32	22	5	30	is ENE		23	12	is WNW	6	30	is ESE	23	12	is WSW	5	30
23	5	30			24	06			6	30		24	06		5	30	23	5	28			24	15		6	32		24	15		5	28
23	28	5	29		24	37			6	31		24	37		5	29	23	28	5	27		24	45		6	33		24	45		5	27

LATITUDE 19 DEGREES.

LATITUDE 20 DEGREES.

NORTH.

DECLINATION.

SOUTH.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	D. M.	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	D. M.	H. M.	☉ Rif	D. M.	☉ Sets	H. M.	☉ Rif	D. M.	☉ Sets	H. M.			
0	6	E.	—	N—	W.	6	—	E.	—	S.—	W.	6	—	E.	—	N—	W.	6	—	E.	—	S.—	W.	6	—	E.	—	S.—	W.	6	—	
1	5	59			01 03			01 03			5	59	1	5	59			01 04			01 04			6	01			01 04			5	59
2	5	57			02 07			02 07			5	57	2	5	57			02 08			02 08			6	03			02 08			5	57
3	5	56			03 10			03 10			5	56	3	5	56			03 12			03 12			6	04			03 12			5	56
4	5	55			04 14			04 14			5	55	4	5	54			04 16			04 16			6	06			04 16			5	54
5	5	53			05 17			05 17			5	53	5	5	53			05 19			05 19			6	07			05 19			5	53
6	5	52			06 21			06 21			5	52	6	5	51			06 23			06 23			6	09			06 23			5	51
7	5	50			07 24			07 24			5	50	7	5	50			07 27			07 27			6	10			07 27			5	50
8	5	49			08 28			08 28			5	49	8	5	48			08 31			08 31			6	12			08 31			5	48
9	5	48			09 31			09 31			5	47	9	5	47			09 35			09 35			6	13			09 35			5	47
10	5	46	11 15		10 35	11 15		10 35	11 15		5	46	10	5	45	11 15		10 39	11 15		10 39	11 15		6	15	11 15	10 39	11 15	10 39	11 15	5	45
11	5	45	is Eb N		11 38	is Wb N		11 38	is Wb S		5	45	11	5	44	is Eb N		11 43	is Wb N		11 43	is Wb S		6	16	is Eb S	11 54	is Wb S	11 54	is Wb S	5	44
12	5	43			12 42			12 42			5	43	12	5	42			12 47			12 47			6	18			12 47			5	42
13	5	42			13 46			13 46			5	42	13	5	41			13 51			13 51			6	19			13 51			5	41
14	5	40			14 50			14 50			5	40	14	5	40			14 55			14 55			6	20			14 55			5	40
15	5	39			15 53			15 53			5	39	15	5	38			16 00			16 00			6	22			16 00			5	38
16	5	37			16 57			16 57			5	37	16	5	36			17 04			17 04			6	24			17 04			5	36
17	5	36			18 01			18 01			5	36	17	5	35			18 08			18 08			6	25			18 08			5	35
18	5	34			19 05			19 05			5	34	18	5	33			19 12			19 12			6	27			19 12			5	33
19	5	33			20 08			20 08			5	33	19	5	31			20 16			20 16			6	29			20 16			5	31
20	5	32			21 12			21 12			5	32	20	5	30			21 20			21 20			6	30			21 20			5	30
21	5	30	22 30		22 16	22 30		22 16	22 30		5	30	21	5	28	22 30		22 25	22 30		22 25	22 30		6	32	22 30	22 25	22 30	22 25	22 30	5	28
22	5	29	is ENE		23 20	is WNW		23 20	is W s w		5	29	22	5	27	is ENE		23 29	is WNW		23 29	is W s w		6	33	is ESE	23 29	is W s w	23 29	is W s w	5	27
23	5	27			24 24			24 24			5	27	23	5	25			24 34			24 34			6	35			24 34			5	25
23	28	5	26		24 54			24 54			5	26	23	28	5	24		25 04			25 04			6	36			25 04			5	24

(F)

LATITUDE 21 DEGREES.										LATITUDE 22 DEGREES.									
NORTH.			DECLINATION.			SOUTH.				NORTH.			DECLINATION.			SOUTH.			
D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	N	W.	6	E.	S	W.	6	0	6	E.	N	W.	6	E.	S	W.	6
1	5	59	01	04	6	01	04	5	59	1	5	58	01	05	6	02	01	05	5
2	5	57	02	08	6	03	08	5	57	2	5	57	02	09	6	03	02	09	5
3	5	55	03	13	6	05	13	5	55	3	5	55	03	14	6	05	03	14	5
4	5	54	04	17	6	06	17	5	54	4	5	54	04	19	6	06	04	19	5
5	5	52	05	21	6	08	21	5	52	5	5	52	05	23	6	08	05	23	5
6	5	51	06	26	6	09	26	5	51	6	5	50	06	28	6	10	06	28	5
7	5	49	07	30	6	11	30	5	49	7	5	49	07	33	6	11	07	33	5
8	5	48	08	34	6	12	34	5	48	8	5	47	08	38	6	13	08	38	5
9	5	4	09	39	6	14	39	5	46	9	5	45	09	43	6	15	09	43	5
10	5	44	11 15	43	11 15	16	11 15	10 43	11 15	5	44	11 15	10 48	11 15	6	16	11 15	10 48	11 15
11	5	43	is EbN	11 48	is WbN	6 17	is EbS	11 48	is WbS	5	43	11 42	is EbN	11 53	is WbN	6 18	is EbS	11 53	is WbS
12	5	41		12 52	6	19		12 52	5	41	12	40		12 58	6	20		12 58	5
13	5	39		13 57	6	21		13 57	5	39	13	39		14 03	6	21		14 03	5
14	5	38		15 01	6	22		15 01	5	38	14	37		15 08	6	23		15 08	5
15	5	36		16 06	6	24		16 06	5	36	15	35		16 13	6	25		16 13	5
16	5	35		17 11	6	25		17 11	5	35	16	33		17 18	6	27		17 18	5
17	5	33		18 15	6	27		18 15	5	33	17	32		18 23	6	28		18 23	5
18	5	31		19 20	6	29		19 20	5	31	18	30		19 28	6	30		19 28	5
19	5	30		20 24	6	30		20 24	5	30	19	28		20 33	6	32		20 33	5
20	5	28	22 30	21 29	22 30	32	22 30	21 29	22 30	5	28	20	26	22 30	21 39	22 30	34	22 30	21 39
21	5	26	is ENE	22 34	is WNW	6 34	is ESE	22 34	is WSW	5	26	21	25	is ENE	22 41	is WNW	6 35	is ESE	22 45
22	5	25		23 39	6	35		23 39	5	25	22	23		23 50	6	37		23 50	5
23	5	23		24 44	6	37		24 44	5	23	23	21		24 55	6	39		24 55	5
23	28	22		25 14	6	38		25 14	5	22	23	20		25 26	6	40		25 26	5

LATITUDE 23 DEGREES.										LATITUDE 24 DEGREES.																									
NORTH.				DECLINATION.				SOUTH.		NORTH.				DECLINATION.				SOUTH.																	
D. M.	H. M.	⊙ Rises		D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.															
0	6	—	E.	—	N—	W.	6	—	E.	—	S.—	W.	6	—	0	6	—	E.	—	N—	W.	6	—	0	6	—	E.	—	N—	W.	6	—			
1	—	5	58	01	05		6	02	01	05		5	58	1	—	5	58	01	06		6	02		6	02	01	06		5	58	1	—	5	58	
2	—	5	57	02	10		6	03	02	10		5	57	2	—	5	57	02	12		6	03		6	03	02	12		5	57	2	—	5	57	
3	—	5	55	03	15		6	05	03	15		5	55	3	—	5	55	03	17		6	05		6	05	03	17		5	55	3	—	5	55	
4	—	5	53	04	21		6	07	04	21		5	53	4	—	5	53	04	23		6	07		6	07	04	23		5	53	4	—	5	53	
5	—	5	51	05	26		6	09	05	26		5	51	5	—	5	51	05	28		6	09		6	09	05	28		5	51	5	—	5	51	
6	—	5	50	06	31		6	10	06	31		5	50	6	—	5	49	06	34		6	11		6	11	06	34		5	49	6	—	5	49	
7	—	5	4	07	3		6	12	07	37		5	48	7	—	5	47	07	40		6	13		6	13	07	40		5	47	7	—	5	47	
8	—	5	46	08	42		6	14	08	42		5	46	8	—	5	46	08	46		6	14		6	14	08	46		5	46	8	—	5	46	
9	—	5	45	09	47		6	15	09	47		5	45	9	—	5	44	09	51		6	16		6	16	09	51		5	44	9	—	5	44	
10	—	5	43	11 15	52	11 15	6	17	11 15	52	11 15	5	43	10	—	5	42	11 15	57	11 15	6	18	11 15	11 15	6	18	11 15	57	11 15	5	42	11 15	5	42	
11	—	5	41	is EbN	11 58	is WbN	6	19	is EbS	11 58	is WbS	5	41	11	—	5	40	is EbN	12 03	is WbN	6	20	is EbS	12 03	is WbS	12 03	is WbS	12 03	is WbS	5	40	11	—	5	40
12	—	5	39		13 03		6	21		13 03		5	39	12	—	5	38		13 09		6	22		6	22		13 09		5	38	12	—	5	38	
13	—	5	37		14 09		6	23		14 09		5	37	13	—	5	36		14 15		6	24		6	24		14 15		5	36	13	—	5	36	
14	—	5	36		15 14		6	24		15 14		5	36	14	—	5	35		15 21		6	25		6	25		15 21		5	35	14	—	5	35	
15	—	5	34		16 20		6	26		16 20		5	34	15	—	5	33		16 27		6	27		6	27		16 27		5	33	15	—	5	33	
16	—	5	32		17 26		6	28		17 26		5	32	16	—	5	31		17 34		6	29		6	29		17 34		5	31	16	—	5	31	
17	—	5	30		18 31		6	30		18 31		5	30	17	—	5	29		18 40		6	31		6	31		18 40		5	29	17	—	5	29	
18	—	5	28		19 37		6	32		19 37		5	28	18	—	5	27		19 46		6	33		6	33		19 46		5	27	18	—	5	27	
19	—	5	26		20 42		6	34		20 42		5	26	19	—	5	25		20 52		6	35		6	35		20 52		5	25	19	—	5	25	
20	—	5	24	22 30	21 49	22 30	6	36	22 30	20 49	22 30	5	24	20	—	5	23	22 30	21 59	22 30	6	37	22 30	22 30	6	37	22 30	21 59	22 30	5	23	20	—	5	23
21	—	5	23	is ENE	22 55	is WNW	6	37	is ESE	21 55	is WSW	5	23	21	—	5	21	is ENE	23 07	is WNW	6	39	is ESE	23 07	is WSW	23 07	is WSW	23 07	is WSW	5	21	21	—	5	21
22	—	5	21		24 01		6	39		24 01		5	21	22	—	5	19		24 12		6	41		6	41		24 12		5	19	22	—	5	19	
23	—	5	19		25 07		6	41		24 07		5	19	23	—	5	17		25 19		6	43		6	43		25 19		5	17	23	—	5	17	
23	28	5	18		25 38		6	42		25 38		5	18	23	28	5	16		25 50		6	44		6	44		25 50		5	16	23	28	5	16	

LATITUDE 25 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	—	N—	W.	6	—	E.	—
1	5	58	01	06	6	02	01	06	5
2	5	56	02	12	6	04	02	12	5
3	5	54	03	18	6	06	03	18	5
4	5	53	04	25	6	07	04	25	5
5	5	51	05	31	5	09	05	31	5
6	5	49	06	37	6	11	06	37	5
7	5	47	07	43	6	13	07	43	5
8	5	45	08	50	6	15	08	50	5
9	5	43	09	56	6	17	09	56	5
10	5	41	11 15	03 11 15	6 19	11 15	11 03 11 15	5 41	10
11	5	39	is EbN	12 09 is WbN	6 21	is Eb S	12 09 is Wb S	5 39	11
12	5	37	13 16	6 23	13 16	5 37	12	5	36
13	5	35	14 22	6 25	14 22	5 35	13	5	34
14	5	33	15 29	6 27	15 29	5 33	14	5	32
15	5	31	16 35	6 29	16 35	5 31	15	5	30
16	5	29	17 42	6 31	17 42	5 29	16	5	28
17	5	27	18 49	6 33	18 49	5 27	17	5	26
18	5	25	19 56	6 35	19 56	5 25	18	5	24
19	5	22	21 02	5 38	21 02	5 22	19	5	21
20	5	21	22 30	6 39	22 30	5 21	20	5	19
21	5	19	is ENE	23 13 is WNW	6 41	is ESE	23 18 is WSW	5 19	21
22	5	17	24 24	6 43	24 24	5 17	22	5	17
23	5	14	25 32	6 46	25 32	5 14	23	5	14
23	28	5	13	26 04	6 47	26 04	5 13	23	28

LATITUDE 26 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	5	E.	—	N—	W.	6	—	E.	—
1	5	58	01	07	6	02	01	07	5
2	5	56	02	13	6	04	02	13	5
3	5	54	03	20	6	06	03	20	5
4	5	52	04	27	6	08	04	27	5
5	5	50	05	33	6	10	05	33	5
6	5	48	06	41	6	12	06	41	5
7	5	46	07	48	6	14	07	48	5
8	5	44	08	54	6	16	08	54	5
9	5	42	10 01	6 18	10 01	5 42	9	5	40
10	5	40	11 15	11 08 11 15	6 20	11 15	11 08 11 15	5 40	10
11	5	38	is EbN	12 15 is WbN	6 22	is Eb S	12 15 is Wb S	5 38	11
12	5	36	13 23	6 24	13 23	5 36	12	5	36
13	5	34	14 30	6 26	14 30	5 34	13	5	34
14	5	32	15 37	6 28	15 37	5 32	14	5	32
15	5	30	16 44	6 30	16 44	5 30	15	5	30
16	5	28	17 51	6 32	17 51	5 28	16	5	28
17	5	26	18 59	6 34	18 59	5 26	17	5	26
18	5	24	20 06	6 36	20 06	5 24	18	5	24
19	5	21	21 13	6 39	21 13	5 21	19	5	21
20	5	19	22 30	6 41	22 30	5 19	20	5	19
21	5	17	is ENE	23 30 is WNW	6 43	is ESE	23 30 is WSW	5 17	21
22	5	15	24 37	6 45	24 37	5 15	22	5	15
23	5	12	25 46	6 48	25 46	5 12	23	5	12
23	28	5	09	26 38	6 49	26 38	5 09	23	28

LATITUDE 27 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	—	N—	W.	6	—	E.	—
1	5	58	01	08	6	02	01	08	5
2	5	56	02	15	6	04	02	15	5
3	5	54	03	22	6	06	03	22	5
4	5	52	04	29	6	08	04	29	5
5	5	50	05	37	6	10	05	37	5
6	5	48	06	44	5	12	06	44	5
7	5	46	07	51	6	14	07	51	5
8	5	44	08	59	6	16	08	59	5
9	5	41	10 06	6 19	10 06	5 41	9	5	40
10	5	39	11 15	11 14 11 15	6 21	11 15	11 14 11 15	5 39	10
11	5	37	is EbN	12 21 is WbN	6 23	is Eb S	12 21 is Wb S	5 37	11
12	5	35	13 30	6 25	13 30	5 35	12	5	36
13	5	33	14 37	6 27	14 37	5 33	13	5	34
14	5	31	15 45	6 29	15 45	5 31	14	5	32
15	5	29	16 53	6 31	16 53	5 29	15	5	30
16	5	26	18 01	6 34	18 01	5 26	16	5	28
17	5	24	19 09	6 36	19 09	5 24	17	5	26
18	5	22	20 17	6 38	20 17	5 22	18	5	24
19	5	20	22 30	6 40	22 30	5 20	19	5	22
20	5	17	is ENE	23 34 is WNW	6 43	is ESE	23 34 is WSW	5 17	20
21	5	15	24 43	6 45	24 43	5 15	21	5	20
22	5	12	25 51	6 48	25 51	5 12	22	5	18
23	5	10	26 01	6 50	26 01	5 10	23	5	16
23	28	5	09	26 33	6 51	26 33	5 09	23	28

LATITUDE 28 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	—	N—	W.	6	—	E.	—
1	5	58	01	08	6	02	01	08	5
2	5	56	02	16	6	04	02	16	5
3	5	54	03	24	6	06	03	24	5
4	5	51	04	32	6	09	04	32	5
5	5	49	05	40	6	11	05	40	5
6	5	47	06	48	6	13	06	48	5
7	5	45	07	56	6	15	07	56	5
8	5	43	09 04	6 17	09 04	5 43	8	5	41
9	5	41	11 15	11 10 11 15	6 19	11 15	11 10 11 15	5 41	9
10	5	38	is EbN	12 21 is WbN	6 22	is Eb S	12 21 is Wb S	5 38	10
11	5	36	13 28	6 24	13 28	5 36	11	5	36
12	5	34	14 37	6 26	14 37	5 34	12	5	34
13	5	32	15 45	6 28	15 45	5 32	13	5	32
14	5	30	16 54	6 30	16 54	5 30	14	5	30
15	5	27	17 03	6 33	17 03	5 27	15	5	27
16	5	25	18 11	6 35	18 11	5 25	16	5	25
17	5	23	19 20	6 37	19 20	5 23	17	5	23
18	5	20	20 29	6 40	20 29	5 20	18	5	20
19	5	18	22 30	6 42	22 30	5 18	19	5	18
20	5	15	is ENE	23 48 is WNW	6 45	is ESE	23 48 is WSW	5 15	20
21	5	13	24 57	6 47	24 57	5 13	21	5	16
22	5	10	25 06	6 50	25 06	5 10	22	5	14
23	5	08	26 16	6 52	26 16	5 08	23	5	12
23	28	5	07	26 40	6 53	26 40	5 07	23	28

(H)

LATITUDE 29 DEGREES.										LATITUDE 30 DEGREES.																	
NORTH.			DECLINATION.			SOUTH.				NORTH.			DECLINATION.			SOUTH.											
D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	⊙ Sets	H. M.					
0	6	—	E.	—	N.	W.	6	—	E.	—	S.	W.	6	—	E.	—	N.	W.	6	—	E.	—	S.	W.	6	—	
1	5	58		01	09		6	02	01	09		5	58	1	5	58	01	09	6	02	01	09		5	58		
2	5	54		02	17		6	04	02	17		5	56	2	5	55	02	18	6	05	02	18		5	55		
3	5	53		03	26		6	07	03	26		5	53	3	5	53	03	28	6	07	03	28		5	53		
4	5	51		04	34		6	09	04	34		5	51	4	5	51	04	37	6	09	04	37		5	51		
5	5	49		05	43		6	11	05	43		5	49	5	5	48	05	46	6	12	05	46		5	48		
6	5	47		06	52		6	13	06	52		5	47	6	5	46	06	56	6	14	06	56		5	46		
7	5	44		08	01		6	16	08	01		5	44	7	5	44	08	06	6	16	08	06		5	44		
8	5	42		09	09		6	18	09	09		5	42	8	5	41	09	15	6	19	09	15		5	41		
9	5	40	11 15	10 18	11 15		6	20	11 15	10 18	11 15		5	40	9	5	39	11 15	10 24	11 15	6	21	11 15	10 24	11 15	5	39
10	5	37	is EbN	11 27	is WbN		6	23	is EbS	11 27	is WbS		5	37	10	5	37	is EbN	11 34	is WbN	6	23	is EbS	11 34	is WbS	5	37
11	5	35		12 26			6	25		12 26			5	35	11	5	35		12 44		6	26		12 44		5	34
12	5	33		13 45			6	27		13 45			5	33	12	5	32		13 53		6	28		13 53		5	32
13	5	31		14 54			6	29		14 54			5	31	13	5	29		15 03		6	31		15 03		5	29
14	5	28		16 03			6	32		16 03			5	28	14	5	27		16 12		6	33		16 12		5	27
15	5	26		17 12			6	34		17 12			5	26	15	5	24		17 23		6	36		17 23		5	24
16	5	23		18 21			6	37		18 21			5	23	16	5	22		18 32		6	38		18 32		5	22
17	5	21		19 31			6	39		19 31			5	21	17	5	19		19 43		6	41		19 43		5	19
18	5	18		20 41			6	42		20 41			5	18	18	5	17		20 54		6	43		20 54		5	17
19	5	16	22 30	21 51	22 30		6	44	22 30	21 51	22 30		5	16	19	5	14	22 30	22 05	22 30	6	46	22 30	22 05	22 30	5	14
20	5	13	is ENE	23 02	is WNW		6	47	is ESE	23 02	is WSW		5	13	20	5	12	is ENE	23 16	is WNW	6	48	is ESE	23 16	is WSW	5	12
21	5	11		24 12			6	49		24 12			5	11	21	5	09		24 27		6	51		24 27		5	09
22	5	08		25 22			6	52		25 22			5	08	22	5	06		25 38		6	54		25 38		5	06
23	5	06		26 32			6	54		26 32			5	06	23	5	03		26 49		6	57		26 49		5	03
23	28	05		27 05			6	55		27 05			5	05	23	28	02		27 21		6	58		27 21		5	02

LATITUDE 31 DEGREES.										LATITUDE 32 DEGREES.														
NORTH.			DECLINATION.			SOUTH.				NORTH.			DECLINATION.			SOUTH.								
D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	⊙ Sets	H. M.		
0	6	E.	N	W.	6	E.	S.	W.	6	0	6	E.	N	W.	6	E.	S.	W.	6	0	6	E.	S.	
1	5	58	01	10	6	02	01	10	5	58	1	5	58	10	01	6	02	01	10	5	58	1	5	
2	5	55	02	19	6	05	02	19	5	55	2	5	55	02	21	6	05	02	21	5	55	2	5	
3	5	53	03	30	6	07	03	30	5	53	3	5	52	03	33	6	08	03	33	5	52	3	5	
4	5	50	04	40	6	10	04	40	5	50	4	5	50	04	43	6	10	04	43	5	50	4	5	
5	5	48	05	50	6	12	05	50	5	48	5	5	47	05	54	5	13	05	54	5	47	5	5	
6	5	45	07	00	5	15	07	00	5	45	6	5	45	07	05	6	15	07	05	5	45	6	5	
7	5	43	08	11	6	17	08	11	5	43	7	5	42	08	16	6	18	08	16	5	42	7	5	
8	5	41	09	21	6	19	09	21	5	41	8	5	40	09	27	6	20	09	27	5	40	8	5	
9	5	38	11	31	6	22	11	31	5	38	9	5	37	11	38	6	23	11	38	5	37	9	5	
10	5	36	is EbN	11	41	is WbN	6	24	is EbS	11	41	is WbS	5	36	is EbN	11	48	is WbN	6	25	is EbS	11	48	
11	5	33		12	52		6	27		12	52		5	33		13	00		6	28		13	00	
12	5	31		14	02		6	29		14	02		5	31		14	11		6	31		14	11	
13	5	28		15	13		6	32		15	13		5	28		15	23		6	33		15	23	
14	5	26		16	22		6	34		16	32		5	26		16	33		6	36		16	33	
15	5	23		17	34		6	37		17	34		5	23		17	46		6	39		17	46	
16	5	20		18	44		6	40		18	44		5	20		18	57		6	41		18	57	
17	5	18		19	56		6	42		19	56		5	18		20	10		6	44		20	10	
18	5	15		21	07		6	45		21	07		5	15		21	21		6	47		21	21	
19	5	12	22 30	22 19	22 30	6	48	22 30	22 19	22 30	5	12	19	5	10	22 30	22 34	22 30	6	50	22 30	22 34	22 30	
20	5	09	is ENE	23 31	is WNW	6	51	is ESE	23 31	is WSW	5	09	20	5	07	is ENE	23 47	is WNW	6	53	is ESE	23 47	is WSW	
21	5	07		24 43		6	53		24 43		5	07	21	5	04		25 00		6	56		25 00		
22	5	04		25 55		6	56		25 55		5	04	22	5	02		26 13		6	58		26 13		
23	5	02		27 07		6	58		27 07		5	02	23	5	59		27 2		7	01		27 26		
23	28	4		27 41		7	01		27 41		4	59	23	28	4	57		28 00		7	03		28 00	

LATITUDE 33 DEGREE.

LATITUDE 34 DEGREES.

NORTH. DECLINATION. SOUTH.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rif	D. M.	⊙ Sets	H. M.	⊙ Rif	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rif	D. M.	⊙ Sets	H. M.	⊙ Rif	D. M.	⊙ Sets	H. M.		
0	6	—	E.	—	N—	W.	6	—	E.	—	S—	W.	6	—	E.	—	N—	W.	6		
1	5	57			01 11				6 03			01 11			5 57			01 12		5 57	
2	5	55			02 23				6 05			02 23			5 55			02 25		5 55	
3	5	52			03 35				6 08			03 35			5 52			03 38		5 52	
4	5	50			04 46				6 10			04 46			5 50			04 50		5 50	
5	5	47			05 58				6 13			05 58			5 47			06 02		5 47	
6	5	44			07 10				6 16			07 10			5 44			07 15		5 44	
7	5	42			08 21				6 18			08 21			5 42			08 27		5 42	
8	5	39			09 33				6 21			09 33			5 39			09 39		5 39	
9	5	36	11 15	10 45	11 15	6 24	11 15	10 45	11 15	5 36			9 45	11 15	10 52	11 15	6 25	11 15	10 52	11 15	5 35
10	5	34	is Eb N	11 55	is Wb N	6 26	is Eb S	11 55	is Wb S	5 34	10 55	12 05	is Eb N	12 05	is Wb N	6 27	is Eb S	12 05	is Wb S	5 33	
11	5	31			13 09				6 29			13 09			5 31	11 55	13 18		6 30		5 30
12	5	28			14 21				6 32			14 21			5 28	12 55	14 32		6 33		5 27
13	5	26			15 33				6 34			15 33			5 26	13 55	15 44		6 36		5 24
14	5	23			16 45				6 37			16 45			5 23	14 55	16 57		6 39		5 21
15	5	20			17 58				6 40			17 58			5 20	15 55	18 11		6 43		5 17
16	5	17			19 11				6 43			19 11			5 17	16 55	19 25		6 45		5 15
17	5	14			20 24				6 46			20 24			5 14	17 55	20 39		6 48		5 12
18	5	11	22 30	21 36	22 30	6 49	22 30	21 36	22 30	5 11	18 55	22 55	22 30	21 55	22 30	6 51	22 30	21 55	22 30	5 09	
19	5	08	is ENE	22 50	is WNW	6 52	is ESE	22 50	is WSW	5 08	19 55	23 07	is ENE	23 07	is WNW	6 54	is ESE	23 07	is WSW	5 06	
20	5	05			24 04				6 55			24 04			5 05	20 55	24 22		6 57		5 03
21	5	02			25 18				6 58			25 18			5 02	21 55	25 37		7 00		5 00
22	4	59			26 32				7 01			26 32			4 59	22 55	26 52		7 03		4 57
23	4	56			27 46				7 04			27 46			4 56	23 55	28 07		7 06		4 54
23	28	4	54		28 21				7 06			28 21			4 54	23 28	28 43		7 08		4 52

LATITUDE 35 DEGREES.

LATITUDE 36 DEGREES.

NORTH. DECLINATION. SOUTH.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rif	D. M.	⊙ Sets	H. M.	⊙ Rif	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rif	D. M.	⊙ Sets	H. M.	⊙ Rif	D. M.	⊙ Sets	H. M.										
0	6	—	E.	—	N—	W.	6	—	E.	—	S—	W.	6	—	E.	—	N—	W.	6	—									
1	5	57			01	13			6	03			5	57			01	14		5	57								
2	5	54			02	27			6	06			5	54			02	29		5	54								
3	5	52			03	40			6	08			5	52			03	43		5	52								
4	5	49			04	53			6	11			5	49			04	57		5	49								
5	5	46			06	06			6	14			5	46			06	11		5	46								
6	5	43			07	20			6	17			5	43			07	25		5	43								
7	5	40			08	33			6	20			5	40			08	40		5	40								
8	5	37			09	46			6	23			5	37			09	54		5	37								
9	5	35	11 15	11	00	11 15	6	25	11 15	11	00	11 15	5	35	9 —	5	34	11 15	11	08	11 15	5	34						
10	5	32	is Eb N	12	12	is Wb N	6	28	is Eb S	12	12	is Wb S	5	32	10 —	5	31	is Eb N	12	21	is Wb N	6	29	is Eb S	12	21	is Wb S	5	31
11	5	29			13	28			6	31			5	29	11 —	5	28		13	39		6	32			13	39	5	28
12	5	26			14	43			6	34			5	26	12 —	5	24		14	54		6	36			14	54	5	24
13	5	23			15	56			6	37			5	23	13 —	5	21		16	09		6	39			16	09	5	21
14	5	20			17	10			6	40			5	20	14 —	5	18		17	24		6	42			17	24	5	18
15	5	17			18	25			6	43			5	17	15 —	5	15		18	40		6	45			18	40	5	15
16	5	14			19	40			6	46			5	14	16 —	5	12		19	55		6	48			19	55	5	12
17	5	11			20	55			6	49			5	11	17 —	5	09		21	11		6	51			21	11	5	09
18	5	07	22 30	22	10	22 30	6	53	22 30	22	10	22 30	5	07	18 —	5	05	22 30	22	27	22 30	6	55	22 30	22	27	22 30	5	05
19	5	04	is ENE	23	25	is WNW	6	56	is ESE	23	25	is WSW	5	04	19 —	5	04	is ENE	23	44	is WNW	6	58	is ESE	23	44	is WSW	5	02
20	5	01			24	41			6	59			5	01	20 —	4	59		25	00		7	01			25	00	5	59
21	4	58			25	56			7	02			4	58	21 —	4	55		26	17		7	05			26	17	4	55
22	4	54			27	13			7	06			4	54	22 —	4	52		27	35		7	08			27	35	4	52
23	4	51			28	29			7	09			4	51	23 —	4	48		28	52		7	12			28	52	4	48
23	28	4	49		29	05			7	11			4	49	23 28	4	46		29	29		7	14			29	29	4	46

(K)

LATITUDE 37 DEGREES.										LATITUDE 38 DEGREES.										
NORTH.			DECLINATION.			SOUTH.				NORTH.			DECLINATION.			SOUTH.				
D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	
0	6	—	E.	—	N.	W.	6	—	E.	—	S.	W.	6	—	E.	—	N.	W.	6	—
1	5	57		01	15		6	03		01	15		5	57		01	16		6	03
2	5	54		02	30		6	06		02	30		5	54		02	32		6	06
3	5	51		03	45		6	09		03	45		5	51		03	48		6	09
4	5	48		05	00		6	12		05	00		5	48		05	04		6	13
5	5	45		06	16		6	15		06	16		5	45		06	21		6	16
6	5	42		07	31		6	18		07	31		5	42		07	37		6	19
7	5	39		08	47		6	21		08	47		5	39		08	54		6	22
8	5	36	11 15	10	02	11 15	6	24	11 15	10	02	11 15	5	36	11 15	10	10	11 15	6	25
9	5	33	is EbN	11	17	is WbN	6	27	is EbS	11	17	is WbS	5	33	is EbN	11	27	is WbN	6	28
10	5	29		12	32		6	31		12	32		5	29		12	43		6	32
11	5	26		13	50		6	34		13	50		5	26		14	01		6	35
12	5	23		15	06		6	37		15	06		5	23		15	18		6	38
13	5	20		16	22		6	40		16	22		5	20		16	35		6	42
14	5	17		17	38		6	43		17	38		5	17		17	52		6	45
15	5	13		18	55		6	47		18	55		5	13		19	11		6	48
16	5	10		20	11		6	50		20	11		5	10		20	28		6	52
17	5	07	22 30	21	28	22 30	6	53	22 30	21	28	22 30	5	07	22 30	21	46	22 30	6	55
18	5	03	is ENE	22	48	is WNW	6	57	is ESE	22	48	is WSW	5	03	is ENE	23	05	is WNW	6	59
19	5	00		24	04		7	00		24	04		5	00		24	24		7	02
20	4	56		25	21		7	04		25	21		4	56		25	43		7	06
21	4	53		26	39		7	07		26	39		4	53		27	02		7	10
22	4	49		27	58		7	11		27	58		4	49		28	23		7	14
23	4	45		29	17		7	15		29	11		4	45		29	43		7	17
23	28	4	43	29	55		7	17		29	55		4	43	23 28	4	41		7	19

LATITUDE 39 DEGREES.												LATITUDE 40 DEGREES.																			
NORTH.				DECLINATION.				SOUTH.				NORTH.				DECLINATION.				SOUTH.											
D.	M.	H.	M.	⊙ Rises	D.	M.	⊙ Sets	H.	M.	⊙ Rises	D.	M.	⊙ Sets	H.	M.	D.	M.	H.	M.	⊙ Rises	D.	M.	⊙ Sets	H.	M.	D.	M.	⊙ Sets	H.	M.	
0	—	6	—	E.	—	N—	W.	6	—	E.	—	S—	W.	6	—	0	—	6	—	E.	—	N—	W.	6	—	E.	—	S—	W.	6	—
1	—	5	57		01	17		6	03		01	17		5	57	1	—	5	57		01	18		6	03		01	18		5	57
2	—	5	54		02	34		6	06		02	34		5	54	2	—	5	53		02	36		6	07		02	36		5	53
3	—	5	50		03	51		6	10		03	51		5	50	3	—	5	50		03	54		6	10		03	54		5	50
4	—	5	47		05	08		6	13		05	08		5	47	4	—	5	47		05	15		6	13		05	15		5	47
5	—	5	44		06	26		6	16		06	26		5	44	5	—	5	43		06	30		6	17		06	30		5	43
6	—	5	40		07	43		6	20		07	43		5	40	6	—	5	40		07	50		6	20		07	50		5	40
7	—	5	37		09	01		6	23		09	01		5	37	7	—	5	36		09	09		6	24		09	09		5	36
8	—	5	34	11 15	10	19	11 15	6	26	11 15	10	19	11 15	5	34	8	—	5	33	11 15	10	28	11 15	6	27	11 15	10	28	11 15	5	33
9	—	5	31	is EbN	11	37	is WbN	6	29	is EbS	11	37	is WbS	5	31	9	—	5	29	is EbN	11	47	is WbN	6	31	is EbS	11	47	is WbS	5	29
10	—	5	28		12	54		6	32		12	54		5	28	10	—	5	26		13	06		6	34		13	06		5	26
11	—	5	24		14	13		6	36		14	13		5	24	11	—	5	22		14	26		6	38		14	26		5	22
12	—	5	20		15	31		6	40		15	31		5	20	12	—	5	19		15	45		6	41		15	45		5	19
13	—	5	17		16	49		6	43		16	49		5	17	13	—	5	15		17	04		6	45		17	04		5	15
14	—	5	13		18	08		6	47		18	08		5	13	14	—	5	12		18	24		6	48		18	24		5	12
15	—	5	10		19	28		6	50		19	28		5	10	15	—	5	08		19	45		6	52		19	45		5	08
16	—	5	06		20	46		6	54		20	46		5	06	16	—	5	04		20	05		6	56		20	05		5	04
17	—	5	03	22 30	22	0	22 30	6	57	22 30	22	06	22 30	5	03	17	—	5	00	22 30	22	26	22 30	7	03	22 30	22	26	22 30	5	00
18	—	4	59	is ENE	23	25	is WNW	7	01	is ESE	23	25	is WSW	4	59	18	—	4	57	is ENE	23	47	is WNW	7	00	is ESE	23	47	is WSW	4	57
19	—	4	55		24	46		7	05		24	46		4	55	19	—	4	53		24	09		7	07		24	09		4	53
20	—	4	51		26	06		7	09		26	06		4	51	20	—	4	49		26	30		7	11		26	30		4	49
21	—	4	48		27	27		7	12		27	27		4	48	21	—	4	45		27	53		7	15		27	53		4	45
22	—	4	44		28	49		7	16		28	49		4	44	22	—	4	41		29	16		7	19		29	16		4	41
23	—	4	40		30	11		7	20		30	11		4	40	23	—	4	37		30	40		7	23		30	40		4	37
23	28	4	38		30	49		7	22		30	49		4	28	23	28	4	35		31	19		7	25		31	19		4	35

(L)

LATITUDE 41 DEGREES.

LATITUDE 42 DEGREES.

NORTH. DECLINATION. SOUTH.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Set	H. M.	⊙ Rise.	D. M.	⊙ Sets	H. M.					
0	6	E.	N	W.	6	E.	S	W.	6	0	6	E.	N	W.	6	E.	S	W.	6					
1	5	57	01	20	6	03	01	20	5	57	1	5	56	01	21	6	04	01	22					
2	5	53	02	39	6	07	02	39	5	53	2	5	53	02	41	6	07	02	41					
3	5	50	03	58	6	10	03	58	5	50	3	5	49	04	02	6	11	04	02					
4	5	46	05	18	6	14	05	18	5	46	4	5	46	05	23	6	14	05	23					
5	5	43	06	38	6	17	06	38	5	43	5	5	42	06	44	6	18	06	44					
6	5	39	07	57	6	21	07	57	5	39	6	5	38	08	05	6	22	08	05					
7	5	35	09	17	6	25	09	17	5	35	7	5	35	09	26	6	25	09	26					
8	5	32	11	15	6	28	11	15	5	32	8	5	31	11	15	6	28	11	15					
9	5	28	is EbN	11	58	is WbN	6	32	is EbS	5	28	9	5	27	is EbN	12	09	is WbN	6	33	is EbS	12	09	is WbS
10	5	25	13	18	6	35	13	18	5	25	10	5	23	13	31	6	37	13	31					
11	5	21	14	39	6	39	14	39	5	21	11	5	20	14	53	6	40	14	53					
12	5	17	16	00	6	43	16	00	5	17	12	5	16	16	15	6	44	16	15					
13	5	14	17	20	6	46	17	20	5	14	13	5	12	17	37	6	48	17	37					
14	5	10	18	42	6	50	18	42	5	10	14	5	08	19	00	6	52	19	00					
15	5	06	20	04	6	54	20	04	5	06	15	5	04	20	23	6	56	20	23					
16	5	02	21	25	6	58	21	25	5	02	16	5	00	21	46	7	00	21	46					
17	4	58	22	30	7	02	22	30	4	58	17	4	56	22	30	7	04	22	30					
18	4	54	is ENE	24	10	is WNW	7	06	is ESE	4	54	18	4	52	is ENE	24	34	is WNW	7	08	is ESE	24	34	is WSW
19	4	50	25	33	7	10	25	33	4	50	19	4	46	25	58	7	14	25	58					
20	4	46	26	56	7	14	26	56	4	46	20	4	43	27	24	7	17	27	24					
21	4	42	28	21	7	18	28	21	4	42	21	4	39	28	5	7	21	28	50					
22	4	38	29	45	7	22	29	45	4	38	22	4	35	30	16	7	25	30	16					
23	4	33	31	11	7	27	31	11	4	33	23	4	30	31	43	7	30	31	43					
23	28	31	31	51	7	29	31	51	4	31	23	28	4	28	32	24	7	32	32	24				

LATITUDE 43 DEGREES.

LATITUDE 44 DEGREES.

NORTH. DECLINATION. SOUTH.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.					
0	6	E.	N	W.	6	E.	S	W.	6	0	6	E.	N	W.	6	E.	S	W.	6					
1	5	56	01	22	6	04	01	22	5	56	1	5	56	01	23	6	04	01	23					
2	5	53	02	44	6	07	02	44	5	53	2	5	52	02	47	6	08	02	47					
3	5	49	04	06	6	11	04	06	5	49	3	5	48	04	10	6	12	04	10					
4	5	45	05	28	6	15	05	28	5	45	4	5	45	05	34	6	15	05	34					
5	5	41	06	51	6	19	06	51	5	41	5	5	41	06	50	6	19	06	58					
6	5	38	08	13	6	22	08	13	5	38	6	5	37	08	21	6	23	08	21					
7	5	34	09	35	6	26	09	35	5	34	7	5	33	09	45	6	27	09	45					
8	5	30	11	15	6	30	11	15	5	30	8	5	29	11	15	6	31	11	15					
9	5	26	is EbN	12	21	is WbN	6	34	is EbS	5	26	9	5	25	is EbN	12	34	is WbN	6	35	is EbS	12	34	is WbS
10	5	22	13	44	6	38	13	44	5	22	10	5	21	13	56	6	39	13	56					
11	5	18	15	0	6	42	15	07	5	18	11	5	17	15	22	6	43	15	22					
12	5	14	16	31	6	46	16	31	5	14	12	5	13	16	48	6	47	16	48					
13	5	10	17	55	6	50	17	55	5	10	13	5	08	18	19	6	52	18	19					
14	5	06	19	18	6	54	19	18	5	06	14	5	04	19	39	6	56	19	39					
15	5	02	20	43	6	58	20	43	5	02	15	5	00	21	05	6	00	21	05					
16	5	58	22	30	7	02	22	30	4	58	16	5	56	22	30	7	04	22	30					
17	4	54	is ENE	23	34	is WNW	7	06	is ESE	4	54	17	4	51	is ENE	23	59	is WNW	7	09	is ESE	23	59	is WSW
18	4	49	24	58	7	11	24	58	4	49	18	4	47	25	26	7	13	25	26					
19	4	45	26	25	7	15	26	25	4	45	19	4	42	26	54	7	18	26	54					
20	4	39	27	53	7	19	27	53	4	39	20	4	38	28	23	7	22	28	23					
21	4	36	29	20	7	24	29	20	4	36	21	4	33	29	53	7	27	29	53					
22	4	32	30	47	7	28	30	40	4	32	22	4	28	31	12	7	32	31	12					
23	4	27	32	16	7	33	32	16	4	27	23	4	24	32	41	7	36	32	41					
23	28	24	32	59	7	36	32	59	4	24	23	28	4	21	33	36	7	39	33	36				

(M)

LATITUDE 45 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M. H. M.			© Rises D. M.			© Sets H. M.			© Rises D. M.			© Sets			
0	6	—	E.	—	N.	W.	6	—	E.	—	S.	W.	6	—	
1	5	56		01	25		6	04		01	25		6	04	
2	5	52		02	50		6	08		02	50		6	08	
3	5	48		04	15		6	12		04	15		6	12	
4	5	44		05	40		6	16		05	40		6	16	
5	5	40		07	05		6	20		07	05		6	20	
6	5	36		08	30		6	24		08	30		6	24	
7	5	32	11 15	09	56	11 15	6	28	11 15	09	56	11 15	6	28	
8	5	28	is EbN	11	21	is WbN	6	32	is EbS	11	21	is WbS	5	32	
9	5	24		12	47		6	36		12	47		5	36	
10	5	19		14	13		6	41		14	13		5	41	
11	5	15		15	38		6	45		15	38		5	45	
12	5	11		17	06		6	49		17	06		5	49	
13	5	07		18	33		6	53		18	33		5	53	
14	5	02		20	00		6	58		20	00		5	58	
15	4	58	22 30	21	28	22 30	7	02	22 30	21	28	22 30	5	02	
16	4	53	is ENE	22	56	is WNW	7	07	is ESE	22	56	is WSW	4	07	
17	4	49		24	25		7	11		24	25		4	11	
18	4	44		25	24		7	16		25	24		4	16	
19	4	41		27	25		7	21		27	25		4	21	
20	4	35		28	56		7	25		28	56		4	25	
21	4	30		30	27		7	30		30	27		4	30	
22	4	25		31	58		7	35		31	58		4	35	
23	4	20	33 45	33	30	35 45	7	40	33 45	33	30	33 45	4	40	
23	28	4	17	is NEBE	34	16	is NWBW	7	43	is SEBE	34	16	is SWBW	4	43

LATITUDE 46 DEGREES.

NORTH.

DECLINATION.

SOUTH.

M. D. M. H. M.				Rises D. M. © Sets H. M.				Rises D. M. © Sets H. M.			
E. — N — W.				E. — S. — W.				E. — S. — W.			
56	1	5	58	01	26	6	04	01	26	6	04
52	2	5	52	02	53	6	08	02	53	5	58
48	3	5	48	04	19	6	12	04	19	5	52
44	4	5	43	05	46	6	17	05	46	5	48
40	5	5	39	07	12	6	21	07	12	5	43
36	6	5	35	08	39	6	25	08	39	5	39
32	7	5	31	10	06	6	29	10	06	5	35
28	8	5	27	11	34	6	33	11	34	5	31
24	9	5	22	13	01	6	38	13	01	5	27
19	10	5	18	14	28	6	42	14	28	5	22
15	11	5	14	15	56	6	46	15	56	5	18
11	12	5	09	17	25	6	51	17	25	5	14
7	13	5	05	18	54	6	55	18	54	5	09
3	14	5	00	20	23	7	00	20	23	5	05
8	15	4	56	21	52	7	04	21	52	5	00
3	16	4	51	22	23	7	09	22	23	4	56
9	17	4	46	24	53	7	14	24	53	4	51
4	18	4	41	26	25	7	19	26	25	4	46
1	19	4	36	27	58	7	24	27	58	4	41
5	20	4	31	29	31	7	29	29	31	4	36
9	21	4	26	31	03	7	34	31	03	4	31
5	22	4	21	32	37	7	39	32	37	4	26
9	23	4	16	33	45	7	44	33	45	4	21
1	23	28	13	34	59	7	47	34	59	4	16

LATITUDE 47 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.		H. M.		Rises		D. M.		Sets		H. M.		Rises		D. M.		Sets		H. M.					
0		6		E.		01		N		W.		6		E.		01		S		W.		6	
1	5	56		01	28		6	04		01	28		6	09		02	56		5				
2	5	51		02	56		6	09		02	56		6	13		04	24		5				
3	5	47		04	24		6	13		04	24		6	17		05	52		5				
4	5	43		05	52		6	17		05	52		6	21		07	20		5				
5	5	39		07	20		6	21		07	20		6	26		08	49		5				
6	5	34		08	49		6	26		08	49		6	30	11	10	18	11	19	5			
7	5	30	11	15	10	18	11	15	6	30	11	15	10	18	11	19	5	3					
8	5	25	is EbN	11	47	is NbW	6	35	is EbS	11	47	is WbS	5	35	is EbS	11	47	is WbS	5	2			
9	5	21		13	16		6	39		13	16		5	39		13	16		5	2			
10	5	17		14	44		6	43		14	44		5	43		14	44		5	1			
11	5	12		16	15		6	48		16	15		5	48		16	15		5	1			
12	5	07		17	45		6	53		17	45		5	53		17	45		5	0			
13	5	03		19	16		6	57		19	16		5	57		19	16		5	0			
14	4	58		20	47		7	02		20	47		5	58		20	47		5	0			
15	4	53	22	30	22	18	22	30	7	07	22	30	22	18	22	30	4	5					
16	4	48	is ENE	23	50	is WNW	7	12	is ESE	23	50	is WSW	4	48	is ENE	23	50	is WSW	4	5			
17	4	43		25	23		7	17		25	23		4	43		25	23		4	4			
18	4	38		26	57		7	22		26	57		4	38		26	57		4	4			
19	4	33		28	22		7	27		28	22		4	33		28	22		4	38			
20	4	28		30	07		7	32		30	07		4	28		30	07		4	33			
21	4	23		31	42		7	37		31	42		4	23		31	42		4	28			
22	4	17	33	45	33	18	33	45	7	43	33	45	33	18	33	45	4	23					
23	4	12	is NEBE	34	56	is NWBW	7	48	is SEBE	34	56	is SWBW	4	12	is NEBE	34	56	is SWBW	4	17			
23	28	4	09		35	44		7	51		35	44		4	09		35	44		4	12		

LATITUDE 48 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	© Rises	D. M.	© Sets	H. M.	© Rises	D. M.	© Sets	H. M.					
0	6	E.	—	N	W.	6	—	E.	—	S.	W.	6	—	
1	5	56	01	29		6	04		01	29		5	56	
2	5	51	02	56		6	09		02	56		5	51	
3	5	47	04	29		6	13		04	29		5	47	
4	5	42	05	59		6	18		05	59		5	42	
5	5	38	07	29		6	22		07	29		5	38	
6	5	33	08	59		6	27		08	59		5	33	
7	5	29	11	15	10	30	11	15	10	30	11	15	5	29
8	5	24	is EbN	12	00	is WbN	6	31	is EbS	12	00	is WbS	5	24
9	5	19		13	31		6	41		13	31		5	19
10	5	15		15	02		6	45		15	02		5	15
11	5	10		16	34		6	50		16	34		5	10
12	5	05		18	06		6	55		18	06		5	05
13	5	01		19	39		6	59		19	39		5	01
14	4	56	22	30	21	12	22	30	7	04	22	30	4	56
15	4	51	is ENE	22	45	is WNW	7	09	is ESE	22	45	is WSW	4	51
16	4	46		24	20		7	14		24	20		4	46
17	4	41		25	55		7	19		25	55		4	41
18	4	35		27	31		7	25		27	31		4	35
19	4	30		29	07		7	30		29	07		4	30
20	4	25		30	45		7	35		30	45		4	25
21	4	19	33	45	32	23	33	45	7	41	33	45	4	19
22	4	13	is NEBE	34	03	is NWBW	7	47	is SEBE	34	03	is SWBW	4	13
23	4	07		35	43		7	53		35	43		4	07
24	4	04		36	31		7	56		36	31		4	04

(N)

LATITUDE 49 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	N	W.	6	E.	S	W.	6
1	5	55	01 31		6	05	01 31		5 55
2	5	51	03 03		6	09	03 03		5 51
3	5	46	04 34		6	14	04 34		5 46
4	5	42	06 06		6	18	06 06		5 42
5	5	37	07 38		6	23	07 38		5 37
6	5	32	09 42		6	28	09 42		5 32
7	5	28	11 15	10 14	11 15	5 32	11 15	10 14	11 15
8	5	23	is Eb N	12 47	is Wb N	6 37	is Eb S	12 47	is Wb S
9	5	18	13 00		6	42	13 00		5 18
10	5	13	15 21		6	47	15 21		5 13
11	5	08	16 54		6	52	16 54		5 08
12	5	03	18 28		6	57	18 28		5 03
13	4	58	20 03		7	02	20 03		4 58
14	4	53	22 30	21 38	22 30	7 07	22 30	21 38	22 30
15	4	48	is ENE	23 14	is WNW	7 12	is ESE	23 14	is WSW
16	4	43	24 51		7	17	24 51		4 43
17	4	38	26 28		7	22	26 28		4 38
18	4	32	28 06		7	28	28 06		4 32
19	4	27	29 45		7	33	29 45		4 27
20	4	21	31 25		7	39	31 25		4 21
21	4	15	33 06	33 45	7 45	33 45	33 06	33 45	4 15
22	4	09	is NEBE	34 48	is NWBW	7 51	is SEBE	34 48	is SWBW
23	4	03	36 33		7	57	36 33		4 03
23	28 4	00	37 22		8	00	37 22		4 00

LATITUDE 50 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.				
0	6	E.	01	33	W.	6	05	E.	01	33	W.	6	05
1	5	55	03	06		6	10		03	06		5	55
2	5	50	04	40		6	14		04	40		5	50
3	5	46	06	14		6	19		06	14		5	46
4	5	41	07	48		6	24		07	48		5	41
5	5	36	09	21		6	29		09	21		5	36
6	5	31	11	15	10	15	11	15	10	15	11	5	31
7	5	26	12	29	12	29	12	29	12	29	12	5	26
8	5	21	14	05	14	05	14	05	14	05	14	5	21
9	5	16	15	40	15	40	15	40	15	40	15	5	16
10	5	11	17	16	17	16	17	16	17	16	17	5	11
11	5	06	18	52	18	52	18	52	18	52	18	5	06
12	5	01	20	29	20	29	20	29	20	29	20	5	01
13	4	56	22	06	22	06	22	06	22	06	22	4	56
14	4	51	23	45	23	45	23	45	23	45	23	4	51
15	4	46	25	24	25	24	25	24	25	24	25	4	46
16	4	40	27	03	27	03	27	03	27	03	27	4	40
17	4	37	28	43	28	43	28	43	28	43	28	4	37
18	4	29	30	25	30	25	30	25	30	25	30	4	29
19	4	23	32	08	32	08	32	08	32	08	32	4	23
20	4	17	33	45	33	45	33	45	33	45	33	4	17
21	4	11	35	52	35	52	35	52	35	52	35	4	11
22	4	05	37	26	37	26	37	26	37	26	37	4	05
23	3	58	38	17	8	05	38	17	8	05	38	3	58
23	28	3	55		8	05			8	05		3	55

LATITUDE 51 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.							
0	6	E.	01	35	W.	6	05	E.	01	35	W.	6	05			
1	5	55	03	10		6	10		03	10		5	55			
2	5	50	04	46		6	15		04	46		5	50			
3	5	45	06	22		6	20		06	22		5	45			
4	5	40	07	58		6	25		07	58		5	40			
5	5	35	09	33		6	30		09	33		5	35			
6	5	30	11	09	11	15	6	35	11	09	11	15	5	30		
7	5	25	12	45	is WbN	6	40	is EbS	12	45	is WbS	5	25			
8	5	20	14	24		6	45		14	24		5	20			
9	5	15	16	01		6	50		16	01		5	15			
10	5	10	17	39		6	56		17	39		5	10			
11	5	04	19	18		7	01		19	18		4	59			
12	4	59	20	57	22	30	7	06	22	30	20	57	22	30	4	54
13	4	54	22	37	is WNW	7	12	is ESE	22	37	is WSW	4	48			
14	4	48	24	18		7	17		24	18		4	43			
15	4	43	25	59		7	23		25	59		4	37			
16	4	37	27	41		7	29		27	41		4	31			
17	4	31	29	24		7	35		29	24		4	25			
18	4	25	31	08		7	41		31	08		4	19			
19	4	19	32	54	33	45	7	47	33	45	32	54	33	45	4	13
20	4	13	34	41	is NWbW	7	53	is SEbE	34	41	is SWbW	4	07			
21	4	07	36	30		8	00		36	30		4	00			
22	4	00	38	23		8	06		38	23		3	54			
23	3	54	39	14		8	10		39	14		3	50			

LATITUDE 52 DEGREES.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.
0	6	E.	01	37	W.	6	E.	01	37
1	5	55	03	15		6	05	03	15
2	5	50	04	52		6	10	04	52
3	5	45	06	30		6	15	06	30
4	5	39	08	08		6	21	08	08
5	5	34	09	46	11 15	6	26	09	46
6	5	29	11 15	46	11 15	6	31	11 15	46
7	5	24	is EbN	11 24	is WbN	6	36	is E b S	11 24
8	5	19		13 02		6	41		13 02
9	5	13		14 43		6	47		14 43
10	5	08		16 23		6	52		16 23
11	5	02		18 03		6	58		18 03
12	4	57		19 44		7	03		19 44
13	4	51	22 30	21 26	22 30	7	09	22 30	21 26
14	4	46	is ENE	23 08	is wnw	7	14	is ESE	23 08
15	4	40		24 52		7	20		24 52
16	4	34		26 36		7	26		26 36
17	4	28		28 21		7	32		28 21
18	4	22		30 07		7	38		30 07
19	4	15		31 55		7	45		31 55
20	4	09	33 45	33 44	33 45	7	51	33 45	33 44
21	4	02	is NE	35 34	is NW	7	58	is SE	35 34
22	3	55		37 27		8	05		37 27
23	3	48		39 24		8	12		39 24
23	28	3	44	40 23		8	16		40 23

(0)

LATITUDE 53 DEGREES.										LATITUDE 54 DEGREES.																						
NORTH.					DECLINATION.					SOUTH.					NORTH.					DECLINATION.					SOUTH.							
D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.						
0	6	—	E.	—	N.	—	W.	6	—	E.	—	S.	—	W.	6	—	E.	—	N.	—	W.	6	—	E.	—	S.	—	W.	6	—		
1	5	55		01	09			6	05		01	09			5	55	1	5	54		01	42			6	06		01	42	5	54	
2	5	49		03	20			6	11		03	20			5	49	2	5	49		03	24			6	11		03	24	5	49	
3	5	44		04	59			6	16		04	59			5	44	3	5	43		05	06			6	17		05	06	5	43	
4	5	39		06	39			6	21		06	39			5	39	4	5	38		06	4			6	22		06	49	5	38	
5	5	33	11 15	08	19			6	27		08	19			5	33	5	5	32		08	31			6	28		08	31	5	32	
6	5	28	is EbN	10	00	11 15		6	32	11 15	10	00	11 15		5	28	6	5	27	11 15	10	15	11 15		6	33	11 15	10	15	11 15	5	27
7	5	22		11	40	is WbN		6	38	is EbS	11	40	is WbS		5	22	7	5	21	is EbN	11	57	is WbN		6	39	is EbS	11	57	is WbS	5	21
8	5	17		13	21			5	43		13	21			5	17	8	5	15		13	41			6	45		13	41	5	15	
9	5	11		15	04			6	49		15	04			5	11	9	5	10		15	26			6	50		15	26	5	10	
10	5	06		16	46			6	54		16	46			5	06	10	5	04		17	11			6	56		17	11	5	04	
11	5	00		18	29			7	00		18	29			5	00	11	4	58		18	57			7	02		18	57	4	58	
12	4	54		20	12			7	06		20	12			4	54	12	4	52		20	43			7	08		20	43	4	52	
13	4	47	22 30	21	57	22 30		7	11	22 30	21	57	22 30		4	49	13	4	46	E.N.E.	22	30	WNW		7	14	E.S.E.	22	30	WSW.	4	46
14	4	43	is ENE	23	42	is WNW		7	17	is ESE	23	42	is WSW		4	43	14	4	40		24	18			7	20		24	18	4	40	
15	4	37		25	28			7	23		25	28			4	37	15	4	33		26	07			7	2		26	07	4	33	
16	4	31		27	16			7	29		27	16			4	31	16	4	27		27	58			7	33		27	58	4	27	
17	4	24		29	04			7	36		29	04			4	24	17	4	20		29	50			7	40		29	50	4	20	
18	4	18		30	53			7	42		30	53			4	18	18	4	14		31	42			7	46		31	42	4	14	
19	4	01	33 45	32	45	33 45		7	49	33 45	32	45	33 45		4	11	19	4	08	33 45	33	38	33 45		7	52	33 45	33	38	33 45	4	08
20	4	04	is NEBE	34	39	is NWBW		7	56	is SEBE	34	39	is SWBW		4	04	20	4	00	is NEBE	35	35	is NWBW		8	00	is SEBE	35	35	is SWBW	4	00
21	3	5		36	31			8	03		36	31			3	57	21	3	52		37	32			8	08		37	32	3	52	
22	3	50		38	29			8	10		38	29			3	50	22	3	45		39	06			8	15		39	06	3	45	
23	3	43		40	29			8	1		40	29			3	43	23	3	37		41	40			8	23		41	40	3	37	
23	28	3	30	—	32			8	21		41	32			3	39	23	28	3	33		42	38			8	27		42	38	3	33

LATITUDE 55 DEGREES.										LATITUDE 56 DEGREES.																												
NORTH.					DECLINATION.					SOUTH.					NORTH.					DECLINATION.					SOUTH.													
D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.							
0	6	—	E.	—	N.	—	W.	6	—	E.	—	S.	—	W.	6	—	E.	—	N.	—	W.	6	—	E.	—	S.	—	W.	6	—	E.	—	S.	—	W.	6	—	
1	5	54		01	45			6	06		01	45			5	54	1	5	54		01	47			6	06		01	47			5	54			5	54	
2	5	49		03	29			6	11		03	29			5	49	2	5	48		03	34			6	12		03	34			5	48			5	48	
3	5	43		05	14			6	17		05	14			5	43	3	5	42		05	22			6	18		05	22			5	42			5	42	
4	5	37		07	59			6	23		07	59			5	37	4	5	36		07	10			6	24		07	10			5	36			5	36	
5	5	31		08	44			6	29		08	44			5	31	5	5	30		08	57			6	30		08	57			5	30			5	30	
6	5	25	11 15	10	30	11 15		6	35	11 15	10	30	11 15		5	25	6	5	24	11 15	10	47	11 15		6	36	11 15	10	47	11 15		5	24			5	24	
7	5	20	is EbN	12	15	is WbN		6	40	is EbS	12	15	is WbS		5	20	7	5	18	is EbN	12	35	is WbN		6	42	is EbS	12	35	is WbS		5	18			5	18	
8	5	14		14	02			6	46		14	02			5	14	8	5	12		14	24			6	48		14	24			5	12			5	12	
9	5	08		15	49			6	52		15	49			5	08	9	5	06		16	14			6	54		16	14			5	06			5	06	
10	5	02		17	37			6	58		17	37			5	02	10	5	00		18	05			7	00		18	05			5	00			5	00	
11	4	56		19	26			7	04		19	26			4	56	11	4	53		19	56			7	07		19	56			4	53			4	53	
12	4	49	22 30	21	15	22 30		7	11	22 30	21	15	22 30		4	49	12	4	47	22 30	21	49	22 30		7	13	22 30	21	49	22 30		4	47			4	47	
13	4	43	is ENE	23	05	is WNW		7	17	is ESE	23	05	is WSW		4	43	13	4	40	is ENE	23	43	is WNW		7	20	is ESE	23	43	is WSW		4	40			4	40	
14	4	37		24	56			7	23		24	56			4	37	14	4	33		25	37			7	27		25	37			4	33			4	33	
15	4	30		26	49			7	30		26	49			4	30	15	4	26		27	34			7	34		27	34			4	26			4	26	
16	4	23		28	43			7	37		28	43			4	23	16	4	19		29	32			7	41		29	32			4	19			4	19	
17	4	16		30	31			7	44		30	39			4	16	17	4	12		31	31			7	48		31	31			4	12			4	12	
18	4	09	33 45	32	35	33 45		7	51	33 45	32	35	33 45		4	09	18	4	05	33 45	33	33	33 45		7	55	38 45	33	33	33 45		4	06			4	06	
19	4	02	is NEBE	34	37	is NWBW		7	58	is SEBE	34	37	is SWBW		4	02	19	4	02	is NEBE	35	36	is NWBW		8	03	is SEBE	35	36	is SWBW		3	57			3	57	
20	3	55		36	36			8	05		36	36			3	55	20	3	49		37	42			8	11		37	42			3	49			3	49	
21	3	47		38	39			8	13		38	39			3	47	21	3	41		39	51			8	19		39	51			3	41			3	41	
22	3	39		40	47			8	21		40	47			3	39	22	3	33		42	04			8	27		42	04			3	33			3	33	
23	3	31		42	56			8	29		42	56			3	31	23	3	28		44	19			8	32		43	19			3	28			3	28	
23	28	3	27	—	43	58		8	33		43	58			3	27	23	28	3	24		44	25			8	36		44	25			3	24			3	24

LATITUDE 57 DEGREES.

LATITUDE 58 DEGREES.

NORTH.

DECLINATION.

SOUTH.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	D. M.	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	
0	6	E.	N	W.	6	E.	S	W.	6	0	5	E.	N	W.	6	E.	S	W.	6	
1	5	56	01	50	6	06	01	50	5	56	1	5	54	01	53	6	0	01	53	
2	5	48	03	40	6	12	03	40	5	48	2	5	47	03	46	6	13	03	46	
3	5	41	05	31	6	19	05	31	5	41	3	5	41	05	40	6	19	05	40	
4	5	35	07	22	6	25	07	22	5	35	4	5	34	07	34	6	20	07	34	
5	5	29	09	11	5	31	09	11	5	29	5	5	28	11	15	6	26	11	15	
6	5	23	11	04	11	15	11	04	11	15	5	23	6	11	15	6	32	11	15	
7	5	16	is EbN	12	56	is WbN	6	44	is EbS	2	56	is WbS	5	16	7	5	39	is EbS	11	22
8	5	10	14	48	6	50	14	48	5	10	8	5	08	15	14	6	45	13	18	
9	5	04	16	45	6	56	16	45	5	04	9	5	01	17	10	6	52	15	14	
10	4	57	18	33	7	03	18	33	4	57	10	4	54	19	07	7	59	17	10	
11	4	50	20	29	7	10	20	29	4	50	11	4	47	22	30	7	06	19	07	
12	4	44	22	30	7	16	22	30	4	44	12	4	40	22	30	7	13	22	30	
13	4	37	is ENE	24	23	is WNW	7	23	is ESE	24	23	is WSW	4	37	13	4	20	is ESE	23	04
14	4	30	26	21	7	30	26	21	4	30	14	4	33	25	07	7	27	25	07	
15	4	22	28	22	7	38	28	22	4	22	15	4	26	27	09	7	25	27	09	
16	4	15	30	24	7	45	30	24	4	15	16	4	18	29	14	7	34	27	09	
17	4	08	32	27	7	52	32	27	4	15	16	4	11	31	21	7	42	29	14	
18	4	00	33	45	8	00	33	45	4	08	17	4	03	33	45	7	49	31	21	
19	3	52	is NEbE	36	40	is NWbW	8	08	is SEbE	36	46	is SWbW	4	03	33	45	7	49	31	21
20	3	44	38	53	8	16	38	53	3	52	19	3	55	35	40	8	57	33	45	
21	3	35	41	09	8	25	41	09	3	46	20	3	46	37	54	8	05	is SEbE	35	40
22	3	26	45	00	8	34	45	00	3	44	21	3	38	40	12	8	14	37	54	
23	3	17	is N.E.	45	50	is N.W.	3	43	is S.E.	45	50	is S.W.	3	40	12	8	22	40	12	
23	28	12	46	59	8	48	46	59	3	35	21	3	28	42	34	8	32	42	34	
									3	26	22	3	19	44	59	45	8	41	45	
									3	17	23	3	09	47	30	is N.W.	8	41	45	
									3	12	23	3	04	48	43		8	51	is S.E.	
									3	12	23	3	04	48	43		8	47	30	
									3	12	23	3	04	48	43		8	48	43	

LATITUDE 59 DEGREES.

LATITUDE 60 DEGREES.

NORTH.

DECLINATION.

SOUTH.

NORTH.

DECLINATION.

SOUTH.

D. M.	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	D. M.	H. M.	☉ Rises	D. M.	☉ Sets	H. M.	☉ Rises	D. M.	☉ Sets	H. M.						
0	6	E.	N	W.	6	E.	S	W.	6	0	6	E.	N	W.	6	E.	S	W.	6						
1	5	53	01	56	6	07	01	56	5	53	1	5	53	02	—	6	07	02	—						
2	5	47	03	53	6	13	03	53	5	47	2	5	46	04	—	6	14	04	—						
3	5	40	05	50	6	20	05	50	5	40	3	5	39	06	—	6	21	06	—						
4	5	33	07	47	6	27	07	47	5	33	4	5	32	08	01	6	28	08	01						
5	5	27	11	15	6	33	11	15	5	27	5	5	25	11	15	6	35	11	15						
6	5	20	is EbN	11	42	is WbN	6	40	is EbS	11	42	is WbS	5	20	6	12	04	is WbN	6	42	is EbS	11	15	5	25
7	5	13	13	41	6	47	13	41	5	13	7	5	11	14	06	6	47	14	06	5	11	5	18		
8	5	06	15	41	6	54	15	41	5	06	8	5	04	16	10	6	56	16	10	5	04	5	11		
9	5	00	17	41	7	00	17	41	5	00	9	4	56	18	24	7	04	18	24	4	56	4	49		
10	4	52	19	41	7	08	19	41	4	52	10	4	49	20	18	7	11	20	18	4	49	4	41		
11	4	44	22	30	7	16	22	30	4	44	11	4	41	22	30	7	19	22	30	4	41	4	34		
12	4	37	is ENE	23	47	is WNW	7	23	is ESE	23	47	is WSW	4	37	12	4	26	22	30	7	19	22	30	4	34
13	4	30	25	54	7	30	25	54	4	30	13	4	26	26	54	7	34	26	54	4	26	4	18		
14	4	22	27	01	7	38	27	01	4	22	14	4	18	28	55	7	42	28	55	4	18	4	09		
15	4	14	30	12	7	46	30	12	4	14	15	4	09	31	09	7	51	31	09	4	09	4	01		
16	4	06	33	45	7	54	33	45	4	06	16	4	01	33	45	7	59	33	45	4	01	4	52		
17	3	57	is NEbE	34	32	is NWbW	8	03	is SEbE	34	32	is SWbW	3	57	17	3	08	is SEbE	35	47	3	52	3	43	
18	3	49	35	43	8	11	35	43	3	49	18	3	43	38	04	8	17	38	04	3	43	3	34		
19	3	40	37	13	8	20	37	13	3	40	19	3	34	40	36	8	26	40	36	3	34	3	24		
20	3	31	41	37	8	29	41	37	3	31	20	3	24	45	00	8	36	45	00	43	10	45	00	3	13
21	3	21	45	00	8	39	45	00	3	21	21	3	13	is N.E.	45	48	8	47	is S.E.	45	48	is S.W.	3	13	
22	3	11	is N.E.	46	40	is NW	8	49	is S.E.	46	40	ss S.W.	3	11	22	3	58	48	32	3	02	2	51		
23	3	00	49	21	9	00	49	21	3	00	23	2	51	51	23	9	09	51	23	2	51	2	44		
23	28	55	50	38	9	05	50	38	2	55	23	28	2	44	52	47	9	16	52	47	2	44			

(2)

LATITUDE 61 DEGREES.										LATITUDE 62 DEGREES.																				
NORTH.					DECLINATION.					SOUTH.					NORTH.					DECLINATION.					SOUTH.					
D. M.	H. M.	⊙	Riles	D. M.	⊙	Sets	H. M.	⊙	Riles	D. M.	⊙	Sets	H. M.	D. M.	H. M.	⊙	Riles	D. M.	⊙	Sets	H. M.	⊙	Riles	D. M.	⊙	Sets	H. M.			
0	6	—	E.	—	N	W.	6	—	E.	—	S.	W.	6	—	0	6	—	E.	—	N	W.	6	—	E.	—	S.	W.	6	—	
1	5	53		02	04		6	07	02	04		5	53	1	5	52		02	41		6	08		02	41		5	52		
2	5	46		04	08		6	14	04	08		5	46	2	5	45		04	16		6	15		04	16		5	45		
3	5	38		06	11		6	22	06	11		5	38	3	5	37		06	23		6	23		06	23		5	37		
4	5	31		08	16		6	29	08	16		5	31	4	5	30		08	32		6	30		08	32		5	30		
5	5	28	11 15	10	25	11 15	6	32	11 15	10	25	11 15	5	28	5	5	22	11 15	10	42	11 15	6	38	11 15	10	42	11 15	5	22	
6	5	16	is EbN	12	27	is WbN	6	44	is EbS	12	27	is WbS	5	16	6	5	14	is EbN	12	52	is WbN	6	46	is EbS	12	52	is WbS	5	14	
7	5	09		14	40		6	51		14	40		5	09	7	5	07		15	02		6	53		15	02		5	07	
8	5	01		16	12		6	59		16	12		5	01	8	4	59		17	14		7	01		17	14		4	59	
9	4	53		18	49		7	07		18	49		4	53	9	4	41		19	28		7	09		19	28		4	41	
10	4	45	22 30	20	59	22 30	7	15	22 30	20	59	22 30	4	45	10	4	43	22 30	21	42	22 30	7	17	22 30	21	42	22 30	4	43	
11	4	38	is ENE	23	11	is WNW	7	22	is ESE	23	11	is WSW	4	38	11	4	34	is ENE	23	59	is WNW	7	26	is ESE	23	59	is WSW	4	34	
12	4	30		25	24		7	30		25	24		4	30	12	4	26		26	17		7	34		26	17		4	26	
13	4	22		27	39		7	38		27	39		4	22	13	4	17		28	38		7	43		28	38		4	17	
14	4	13		29	56		7	47		29	56		4	13	14	4	08		31	02		7	52		31	02		4	08	
15	4	06	33 45	32	16	33 45	7	54	33 45	32	16	33 45	3	06	15	3	59	33 45	33	27	33 45	8	01	33 45	33	27	33 45	3	59	
16	3	57	is NEBE	34	39	is NWBW	8	03	is SEBE	34	39	is SWBW	3	57	16	3	49	is NEBE	35	57	is NWBW	8	11	is SEBE	35	57	is SWBW	3	49	
17	3	46		37	06		8	14		37	06		3	46	17	3	39		38	31		8	21		38	31		3	39	
18	3	36		39	36		8	24		39	36		3	36	18	3	29		41	10		8	31		41	10		3	29	
19	3	26		42	11		8	34		42	11		3	26	19	3	19	45 00	43	55	45 00	8	41	45 00	43	55	45 00	3	19	
20	3	16	45 00	44	52	45 00	8	44	45 00	44	52	45 00	3	16	20	3	07	is N.E.	46	46	is N.W.	8	53	is S.E.	46	46	is S.W.	3	07	
21	3	05	is N.E.	47	40	is N.W.	8	55	is S.E.	47	40	is S.W.	3	05	21	2	55		49	46		9	05		49	46		2	55	
22	2	53		50	36		9	07		50	36		2	53	22	2	42	56 15	52	56	56 15	9	18	56 15	52	56	56 15	2	42	
23	2	40		53	43		9	20		53	43		2	40	23	2	28	is NEBN	56	20	is NWBN	9	32	is SEBS	56	20	is SWBS	2	28	
23	28	2	34	55	14		9	26		55	14		2	34	23	28	2	20		58	01		9	40		58	01		2	20

LATITUDE 63 DEGREES.										LATITUDE 64 DEGREES.																			
NORTH.					DECLINATION.					SOUTH.					NORTH.					DECLINATION.					SOUTH.				
D. M.	H. M.	⊙	Riles	D. M.	⊙	Sets	H. M.	⊙	Riles	D. M.	⊙	Sets	H. M.	D. M.	H. M.	⊙	Riles	D. M.	⊙	Sets	H. M.	⊙	Riles	D. M.	⊙	Sets	H. M.		
0	6	—	E.	—	N	W.	6	—	E.	—	S.	W.	6	—	0	6	—	E.	—	N	W.	6	—	E.	—	S.	W.	6	—
1	5	52		02	12		6	08		02	12		5	52	1	5	52		02	17		6	08		02	17		5	52
2	5	44		04	27		6	16		04	27		5	44	2	5	44		04	34		6	16		04	34		5	44
3	5	36		06	37		6	24		06	31		5	36	3	5	35		06	51		6	25		06	51		5	35
4	5	28		08	50		6	32		08	50		5	28	4	5	27	11 15	09	09	11 15	6	33	11 15	09	09	11 15	5	27
5	5	20	11 15	11	04	11 15	6	40	11 15	11	04	11 15	5	20	5	5	19	is EbN	11	28	is WbN	6	41	is EbS	11	28	is WbS	5	19
6	5	18	is EbN	13	19	is WbN	6	48	is EbS	13	19	is WbS	5	18	6	5	10		13	48		6	50		13	48		5	10
7	5	04		15	34		6	56		15	34		5	04	7	5	02		16	09		6	58		16	09		5	02
8	4	50		17	51		7	04		17	51		4	56	8	4	56		18	31		7	04		18	31		4	56
9	4	48		20	09		7	12		20	09		4	48	9	4	44	22 30	20	55	22 30	7	10	22 30	20	55	22 30	4	44
10	4	39	22 30	22	29	22 30	7	21	22 30	22	29	22 30	4	39	10	4	35	is ENE	23	20	is WNW	7	25	is ESE	23	20	is WSW	4	35
11	4	30	is ENE	25	13	is WNW	7	30	is ESE	25	13	is WSW	4	30	11	4	26		25	46		7	34		25	46		4	26
12	4	21		27	15		7	39		27	15		4	21	12	4	17		28	19		7	43		28	19		4	17
13	4	12		29	42		7	48		29	42		4	12	13	4	07		30	52		7	53		30	52		4	07
14	4	03	33 45	32	12	33 45	7	57	33 45	32	12	33 45	4	03	14	3	57	33 45	33	29	33 45	8	03	33 45	33	29	33 45	3	57
15	3	53	is NEBE	34	46	is NWBW	8	07	is SEBE	34	46	is SWBW	3	53	15	3	47	is NEBE	36	13	is NWBW	8	13	is SEBE	36	13	is SWBW	3	47
16	3	43		37	23		8	17		37	23		3	43	16	3	36		38	57		8	24		38	57		3	36
17	3	32		40	05		8	28		40	05		3	32	17	3	25		41	50		8	35		41	50		5	25
18	3	22	45 00	42	54	45 00	8	38	45 00	42	54	45 00	3	22	18	3	17	45 00	44	49	45 00	8	47	45 00	44	49	45 00	3	17
19	3	11	is N.E.	45	49	is N.W.	8	49	is S.E.	45	49	is S.W.	3	11	19	3	00	is N.E.	47	58	is N.W.	9	00	is S.E.	47	58	is S.W.	3	00
20	2	57		48	53		9	30		48	533																		

LATITUDE 65 DEGREES.

LATITUDE 66 DEGREES.

NORTH. DECLINATION. SOUTH.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	D. M.	H. M.	⊙ Rises	D. M.	⊙ Set	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.							
0	6	—	E.	—	N—	W.	6	—	E.	—	S—	W.	6	—	E.	—	N—	W.	6	—						
1	5	51		02	23		6	09	02	23		5	51		02	28		6	09	02	23	5	51			
2	5	44		04	44		6	16	04	44		5	44		04	55		6	18	04	55	5	42			
3	5	34		07	17		6	26	07	17		5	34		07	24		6	27	07	24	5	53			
4	5	26	11 15	09	22	11 15	6	34	11 15	09	22	11 15	5	26	11 15	09	53	11 15	6	36	11 15	09	53	5	24	
5	5	17	is EbN	11	54	is WbN	6	43	is EbS	11	54	is WbS	5	17	is EbN	12	22	is WbN	6	45	is EbS	12	22	5	15	
6	5	08		14	19		6	52		14	19		5	08		14	53		6	58		14	53	5	02	
7	4	59		16	48		7	01		16	48		4	59		17	26		7	04		17	26	4	56	
8	4	50		19	14		7	10		19	14		4	50		20	01	22 30	7	14	22 30	20	01	4	46	
9	4	41	22 30	21	43	22 30	7	19	22 30	21	43	22 30	4	41	22 30	20	01	22 30	7	24	22 30	20	01	4	36	
10	4	31	is ENE	24	16	is WNW	7	29	is ESE	24	16	is WSW	4	31	is ENE	22	37	is WNW	7	33	is ESE	22	37	4	27	
11	4	21		26	50		7	39		26	50		4	21		25	16		7	42		25	16	4	18	
12	4	12		29	28		7	48		29	28		4	12		27	59		7	54		27	59	4	06	
13	4	01	33 45	32	10	33 45	7	59	33 45	32	16	33 45	4	01	33 45	30	45	33 45	8	05	33 45	30	45	4	05	
14	3	51	is NEBE	35	01	is NWBW	8	09	is SEBE	35	01	is SWBW	3	51	is NEBE	33	35	is NWBW	8	16	is SEBE	33	35	3	46	
15	3	40		37	46		8	20		37	46		3	40		39	32		8	24		39	32	3	36	
16	3	28		40	42		8	32		40	42		3	28		42	40	45 00	8	40	45 00	42	40	3	20	
17	3	16	45 00	43	46	45 00	8	44	45 00	43	46	45 00	3	16	45 00	45	00	45 00	8	53	45 00	45	00	3	07	
18	3	03	is N.E.	46	58	is N.W.	8	57	is S.E.	46	58	is S.W.	3	03	is N.E.	45	58	is N.W.	8	53	is S.E.	45	58	3	07	
19	2	50		50	23		9	10		50	23		2	50		49	26		9	08		49	26	2	52	
20	2	35	56 15	54	02	56 15	9	25	56 15	54	02	56 15	2	35	56 15	53	11	56 15	9	20	56 15	53	11	2	40	
21	2	18	is NEBN	57	59	is NWBW	9	42	is SEBS	57	59	is SWBS	2	18	is NEBN	57	14	is NWBW	9	39	is SEBS	57	14	2	21	
22	2	00	67 30	62	26	67 30	10	00	67 30	62	26	67 30	2	00	67 30	61	47		9	51		61	47	2	02	
23	1	38	is NNE	67	36	is NNW	10	22	is SSE	67	36	is SSW	1	38	is NNE	73	52	is NNW	10	50	is SSE	73	52	1	10	
23	28	1	22	70	26		10	38		70	26		1	22	23	28	0	51		10	00		78	15	0	51

LATITUDE 66 DEGREES 32 MINUTES.

NORTH. DECLINATION. SOUTH.

D. M.	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.	⊙ Rises	D. M.	⊙ Sets	H. M.					
0	6	—	E.	—	N—	W.	6	—	E.	—	S—	W.	6	—
1	5	51		02	31		6	09		02	31		5	51
2	5	42		05	01		6	18		05	01		5	42
3	5	35		07	33		6	25		07	33		5	35
4	5	23	11 15	10	05	11 15	6	37	11 15	10	05	11 15	5	23
5	5	13	is EbN	12	38	is WbN	6	47	is EbS	12	38	is WbS	5	13
6	5	04		15	13		6	56		15	13		5	04
7	4	54		18	49		7	06		18	49		4	54
8	4	44	22 30	20	27	22 30	7	16	22 30	20	27	22 30	4	44
9	4	34	is ENE	23	08	is WNW	7	26	is ESE	23	08	is WSW	4	34
10	4	24		25	51		7	36		25	51		4	24
11	4	14		28	38		7	46		28	38		4	14
12	4	0	33 45	31	28	33 45	7	57	33 45	31	28	33 45	4	03
13	3	52	is NEBE	34	23	is NWBW	8	08	is SEBE	34	23	is SWBW	3	52
14	3	40		37	25		8	20		37	25		3	40
15	3	28	45 00	40	32	45 00	8	32	45 00	40	32	45 00	3	28
16	3	15	is N.E.	43	48	is N.W.	8	45	is S.E.	43	48	is S.W.	3	15
17	3	01		48	15		8	59		48	15		3	01
18	2	46	56 15	50	54	56 15	9	14	56 15	50	54	56 15	2	46
19	2	30	is NEBN	54	50	is NWBW	9	30	is SEBS	54	50	is SWBS	2	30
20	2	12	67 30	59	12	67 30	9	48	67 30	59	12	66 30	2	12
21	1	51	is NNE	64	09	is NNW	10	09	is SSE	64	09	is SSW	1	51
22	1	26	78 45	70	10	78 45	10	34	78 45	17	10	78 45	1	26
23	0	48	is NbE	78	52	is NbW	11	12	is SbE	78	52	is SbW	0	48
23	28	0	00 North.	90	00 North.	12	00 South	90	00 South	0	00 South	0	00	
midnight			midnight			*	noon			noon				

* In North Latitude, Midnight when North Declination, but Noon when South Declination.

In South Latitude, Noon when North Declination, but Midnight when South Declination.

When in South Latitude, use the Tables with North Declination, as when in North Latitude with South Declination—and with South Declination, as in North Latitude with North Declination.

THE Use of the foregoing Tables, from the Equator to 66 Degrees 32 Minutes, sheweth in North or South Latitude, with North or South Declination, the Time of the Sun's Rising and Setting; and the Point, and Degrees, and Minutes, between the Points of the Compass the Sun Rises and Sets on.

With North Declination, the Sun Rises to the North of the East, and Sets to the North of the West.—With South Declination, the Sun Rises to the South of the East, and Sets to the South of the West.

The first Column under D. M. is the Degrees and Minutes of North or South Declination.

For the Time of Sun Rising and Setting.

The second Column under H. M. is the Hour and Minutes the Sun Rises at, with North Declination, and in the North Latitude.

The Sixth Column under H. M. is the Time the Sun Sets with North Declination in North Latitude, and the Time the Sun Rises with South Declination in North Latitude.

Under H. M. in the Tenth Column, is the Time the ☉ Sets with South Declination in North Latitude.

For the Sun's Bearing at Rising and Setting.

The Third Column under ☉ Rises, is the Points of the Compass the Sun Rises at to the North of the East with North Declination.

The Fourth Column under D. M. is the Degrees and Minutes between the Points, to the North of the East or West.

The Fifth Column under ☉ Sets, is the Point the Sun Sets at with North Declination.

In the Seventh Column under ☉ Rises, is the Points of the Compass the Sun Rises on to the South of the East with South Declination.

In the Eighth Column under D. M. is the Degrees and Minutes between the Points of the Compass the Sun Rises to the South of the East, and Sets to the South of the West, with South Declination.

In the Ninth Column under ☉ Sets, is the Points of the Compass the Sun Sets at with South Declination.

This Table accounts for the motion of the Globe according to the Declination North or South.

When the Sun is in the Equinox, there is no Declination. The Sun then Rises at 6 Hours in the East Point and Sets at 6 on the West Point of the Compass in every Degree of Latitude North or South. The Poles being on a parallel there, the Sun then appears in the Horizon the 24 Hours. When the Declination increaseth to the North, in South Latitude the Day Shorteneth, and in North Latitude it Lengtheneth.

When at the greatest Declination North, in Latitude 66 Degrees 32 Minutes South, the Center of the Sun at Noon is only in the Horizon, but appeareth its own Diameter above the Horizon, or the Lower Edge or Limb the Semidiameter above the Horizon, on account of the Refractions, which is 33 Minutes at the Horizon.

To the Southward of that Latitude the Sun disappears, and when at the greatest North Declination, the South Pole is 23 Degrees 28 Minutes under the Horizon. In North Latitude the Day Lengthens from the Equator Northward to 66 Degrees 32 Minutes, where the Sun's Center is in the Horizon, and the Lower Limb of the apparent Sun is the Semidiameter or 16 Minutes above the Horizon at Midnight, and is on the North Point of the Compass, and continues on that Point at Midnight to the Pole, where the Altitude is 23 Degrees 28 Minutes.

As the Declination decreaseth, the Altitude at the North Pole decreaseth, until the Sun returns to the Equinox, the Poles are then again on a parallel and the Sun enters South Declination, and the South Pole Rises in proportion as the North Pole ascendeth with North Declination, and the North Pole descendeth below the Horizon as the South did with North Declination, and when the Sun is at the greater South Declination it approaches the Equinox again to such Time as the Poles are again on a parallel, and the Sun Rises and Sets at 6 Hours from Noon in every Latitude North or South.

(T.)

The Use of the Tables to find the Variation of the Compass.

In the Tables under D. M. between ☉ Rises and ☉ Sets, is the Amplitude North or South, according to the Declination at the Sun or Stars Rising or Setting.

These Tables only carrying the Degrees of Declination and Latitude, they only answer to give the true Amplitude for such, for odd Minutes see the following Rule.

EXAMPLE I. What is the true Amplitude at Sun Rise, in North Latitude 45 00 the Declination 10 00 South.

In the Table for 45 Degrees, under D. M. with South Declination, and against 10 Degrees South Declination, is 14 15, the Amplitude from which subtract one Point, or 11 Degrees 15 Minutes makes the Amplitude E. b. S. 1 Degree South.

For the Variation of the Compass by said Amplitude.

If the bearing of the Sun by the Compass at Rising be to the South or West of the true Amplitude, the Variation is Westerly; if to the East or North, it is Easterly.

At Sun Setting if to the South or the East of the true Amplitude, it is Easterly; if to the West or the North it is Westerly.

The Tables sheweth that the Sun Sets in the South, with South Declination, and in the North with North Declination. See the Table for 66 32.

Admit the Sun's Amplitude to be 14 15
And the bearing by the Compass be E. S. E. 10 Degrees S. which is 32 30

From the Remainder subtract one Point, being 11 Degrees 15 Minutes 18 15
11 15

Sheweth the Variation to be 1 Point 7 Degrees Westerly 7 00

Again at Sun Set let the true Amplitude be W. 14 15 S.
and by the Compass the bearing W. 4 Degrees N. which is 4 Degrees to the North of the West, the true Amplitude being to the Southward of the West, add to it the 4 Degrees to the North of the West 4 00

From which subtract 1 Point, or 11 15
11 15

Sheweth the Variation to be 1 Point 7 Degrees Westerly 7 8

The shortest way to proportion the odd Minutes of Latitude or Declination, see the following Rule.

If the Latitude was 45 35, and the Declination 10 00

Take for the Latitude	D. M.		D. M.
	{ 45 00	The Amplitude	{ 14 13
	{ 46 00		{ 14 28

The difference is in Minutes 15 of Amplitude

By the Rule of Three, if 1 Degree or 60 Minutes give 15 difference Amplitude, what will 35 Minutes give?

60	15	35	To the Amplitude	D. M.
	35		Add the Minutes	14 13
	75			9
	45		The true Amplitude	14 22

60 | 525 | 8 Minutes 45 Seconds, which is nearest 9 Minutes
480

The Remainder is 45 Seconds

If the Declination was	D. M.	and the Latitude	D. M.
	10 25		45 00
Take for the Declination	{ 10 00	the Amplitude	{ 14 13
	{ 11 00		{ 15 38

The Remainder is the difference 1 25 or 85 Minutes

If 1 Degree or 60 Minutes of Declination give 1 20 or 80 Minutes, what will the 25 odd Minutes of Declination give in the Amplitude.

60	80	25	To the Amplitude	14 28
	25		Add Minutes	33
	400		The true Amplitude	14 54
	160			

60 | 2000 | 33 Minutes 20 Seconds of Amplitude
180

200
180

20 Seconds

(U)

When required to Regulate a Watch by the Sun Rising or Setting, by the foregoing Tables.

The Refraction must be considered as it is near 33 Minutes at the Horizon, so that when the Centre of the Sun, which is the Time to Set the Watch by Sun Rising or Setting is in the Horizon, the Centre of the apparent Sun, is 33 Minutes above the Horizon, the lower Edge 17 Minutes above the Horizon, the upper Edge 49 Minutes above the Horizon, therefore, when the lower Edge is above the Horizon 17 Minutes, if observed by a Quadrant, if by the Eye only, when it appears about half the Diameter or Semi-diameter above the Horizon, is the Time of Rising or Setting.

If the lower Edge is obscured by clouds, take the upper Edge when about a Diameter and half above the Horizon, if observed by a Quadrant, when 49 Minutes above the Horizon is the Time.

The Tables being formed only for Degrees of Latitude and Declination, they answer for Setting the Watch for common Use, but when the Regulation of the Watch is required to Seconds, then the odd Minutes of Latitude is needful, and of the Declination, therefore the Hourly Variation of the Sun's Declination, must be attended to in the following manner.

The Declination being calculated for Noon in the Meridian of London, as before mentioned in the Instructions for Hourly Variation, when it is increasing, it is less before Noon than Afternoon; when decreasing, it is more before Noon than Afternoon.

When the Sun is passing the Equinox, the Daily Variation is 24 Minutes, and the Hourly Variation 1 Minute, and as the Sun then Rises at 6 in the Morning, the Declination on that Day being nothing at Noon, if the Sun passes the Line at Noon, it is 6 Minutes South Declination at Sun Rising, and 6 North Declination at Sun Setting.

When the Declination is 36 Minutes North and increasing, at Sun Rising it is 30 Minutes, and at Sun Setting it is 42 Minutes, and so in proportion as it increaseth to the North, according to the Daily Variation, which decreaseth as the Declination increases, which is found by subtracting the Declination of the Day before, at Noon, and the present Day at Noon, for Sun Rising, and the Declination for the next Day at Noon, and the present Day at Noon for Sun Setting. To save trouble in proportioning the Hourly Variation, see the Tables of Hourly Variation, and the Instructions for the Use of them.

EXAMPLE I. On the 20th day of January 1796, the Sun's Declination at Noon 20 08 North, and in the Latitude 48 00 North, and in the Meridian of London the Sun Rising by the Watch was at 7 Hours 35 Minutes, and in the Table for 48 Degrees, against 20 Degrees Declination, in the first Column, and under H. M. in the sixth Column for Sun Rises in South Declination, is 7 Hours 35 Minutes, being no difference between the Watch and Tables, the Watch is Right for common Use, but the odd Minutes of Declination, and the Hourly Variation of the Sun's Declination, will make some difference.

	D.	M.
To find which, subtract from the Declination of the Day before, which is	20	20
And the Declination for the Day given	20	8
The Remainder is the Daily Difference		0 12

Enter the Tables for Hourly Variation in the Meridian of London, and against 12 Daily Differences in the left hand Column, and under 8 Hours, which is nearest 7 Hours 35 Minutes, is 2 Minutes, the Declination being decreasing, add to the Declination at Noon

The amount of the Hourly Variation	0	2
The Declination at 8 Hours in the Morning	20	10
H. M.		
Take the Difference in the Tables of Sun's bearing for the Declination 20	7	35
For 21 Degrees of Declination	7	41
The Difference is		6

Then by the Rule of Three, if one Degree or 60 Minutes of Declination gives 6 Minutes difference of Time, what will 8 Minutes difference give? the answer will be 48 Seconds, to be added to the Sun's Rising, which is the true Time of the Day, then the Watch is Regulated when altered to that Time.

Work in the same manner at Sun Setting, only take Notice of the Remarks in adding or subtracting, according as the Declination is increasing or decreasing.

(A)

the Watch is Right, the Altitude of the Sun at Midnight will give the Latitude in the same manner with the Tables. If the Watch is incorrect, see the Rules for the Variation of the Declination, in Page 25 and 26. If the Declination is increasing, see the Rules for the Variation of the Compass Work as before.

The Altitude at Midnight 1 12 48

(W)

(W.)

When the Latitude exceeds 66 33 North, with North Declination 23 28, or in South Latitude, with South Declination 23 28, the Sun is above the Horizon, increasing in Altitude as the Latitude increases. At 90 Degrees the Altitude is 23 28, in that case being deprived of the Sun's Rising or Setting, to Set the Watch or find the true Amplitude, I have formed the foregoing Table for a Substitute.

At the top of the Columns is the Degrees of Latitude which answers for North or South Latitude, from 66 Degrees to 90 00.

On the left-hand Column under M. is the Minutes between the Degrees, the Use of which, by looking under the Degrees of Latitude the Ship is in, and against the odd Minutes, is the Altitude of the Sun at Midnight, when the Declination is 23 28. If the Declination is less than 23 28, either by increase or decrease, from 23 28 Subtract the Declination, the remainder Subtract from what stands in the Tables, for the Latitude in, gives the Altitude at Midnight, the Sun being at Midnight on the true North Point, the Variation is likewise to be found, the Refraction and the Height of the Eye above the Surface to be allowed for as in all other cases in observing.

EXAMPLE I. In the Latitude 75 00 North, the Sun's Declination at Midnight, found by the foregoing Examples, for the Variation of the Sun's Declination is 23 28, what is the Altitude?

Under 75 00 at the top, and against 00 Minutes, is 8 Degrees and 28 Minutes of Altitude.

	D.	M.	S.
If the Height of the Eye be 10 Feet	8	28	0
Add		3	0
For the Refraction with that Altitude, add		27	30

The apparent Altitude 8 58 30

Set the Index of the Quadrant to 8 58 30, and watch when the Sun is that Height, then it is twelve o'Clock at Night and the Sun due North.

For the Variation of the Compass, Set the Sun by the compass, and if by the Compass the bearing in North Latitude is to the Eastward of the North, the Variation is to the Westward, if the Bearing is West, the Variation is East.

If in South Latitude the Bearing is to the East of the South, the Variation is West; if to the West of the South, it is East. The difference of the Bearing from North in North Latitude, and from South in South Latitude, is the Amount of Variation.

EXAMPLE II. On the 10th Day of August 1796, the Declination at Noon 20 15 North decreasing, and in the Latitude 75 45 North, and Longitude 15 West, the Altitude of the Sun is required at Midnight.

First find the Declination at Midnight.

	D.	M.
For the daily Variation, subtract the Declination of the Day before	15	37
The Variation for the Day given	15	20

The Daily difference of Declination is 00 17

In the Tables for Hourly Variations, under 15 Degrees and under 12 P. M. and against 17 Daily Difference is the Hourly Difference at Midnight

	M.	S.
The Declination being decreasing from the Declination of the Day before	9	12
Subtract the Hourly Variation	15	37 00
	9	12

The Declination at Midnight 15 27 48

For the Sun's Altitude at Midnight.

Enter the Table and under 76 Degrees of Latitude, and against 45 Minutes, the Altitude at Midnight with the greatest Declination is

	D.	M.	S.
From the greatest Declination	23	28	00
Subtract the Declination at Midnight	15	27	48

The difference of Declination gives the difference of Altitude 8 00 12

From the Altitude Subtract difference of Declination

The Altitude at Midnight 1 12 48

Then Set the Watch at 12 o'Clock at Night, and for the Variation of the Compass Work as before.

If the Declination is increasing, see the Rules for the Variation of the Declination, in Page 25 and 26.

If the Watch is Right, the Altitude of the Sun at Midnight will give the Latitude in the same manner with the Tables.

A Table of the Variation of the Declination from 23 28 to the 15th of August 1796, when the Declination is 23 28.

5 DEGREES.				6 DEGREES.				7 DEGREES.				8 DEGREES.				9 DEGREES.				10 DEGREES.			
M	C.	F.	C of F	M	C.	F.	C of F	M	C.	F.	C of F	M	C.	F.	C of F	M	C.	F.	C of F	M	R.	F.	N.E.
0	—	—	—	0	294	28	8848	0	252	16	7576	0	220	18	6618	0	195	21	5871	0	175	27	5277
1	—	—	—	1	294	3	8823	1	251	28	7558	1	220	4	6604	1	195	11	5861	1	175	18	5268
2	352	—	10560	2	293	9	8799	2	251	10	7540	2	219	20	6590	2	195	0	5850	2	175	9	5259
3	350	24	10524	3	292	15	8775	3	250	22	7522	3	219	6	6576	3	194	19	5839	3	175	0	5250
4	349	19	10489	4	291	21	8751	4	250	4	7504	4	218	22	6562	4	194	8	5828	4	174	21	5241
5	348	14	10454	5	290	27	8727	5	249	16	7486	5	218	8	6548	5	193	27	5817	5	174	12	5232
6	347	10	10420	6	290	3	8703	6	248	28	7468	6	217	24	6534	6	193	16	5806	6	174	3	5223
7	346	6	10386	7	289	9	8679	7	248	10	7450	7	217	10	6520	7	193	5	5795	7	173	24	5214
8	345	2	10355	8	288	15	8655	8	247	22	7432	8	216	26	6506	8	192	24	5784	8	173	15	5205
9	343	28	10318	9	287	21	8631	9	247	4	7414	9	216	13	6493	9	192	13	5773	9	173	6	5196
10	342	24	10284	10	286	27	8607	10	246	15	7395	10	216	00	6480	10	192	3	5763	10	172	27	5187
11	341	21	10251	11	286	3	8583	11	245	28	7378	11	215	16	6466	11	191	22	5752	11	172	18	5178
12	340	18	10218	12	285	9	8559	12	245	11	7361	12	215	4	6454	12	191	11	5741	12	172	9	5169
13	339	15	10185	13	284	15	8535	13	244	24	7344	13	214	19	6439	13	191	0	5730	13	172	0	5160
14	338	12	10152	14	283	21	8511	14	244	7	7327	14	214	6	6426	14	190	19	5719	14	171	22	5152
15	337	10	10120	15	282	27	8487	15	243	20	7310	15	213	23	6413	15	190	8	5708	15	171	13	5143
16	336	8	10088	16	282	3	8463	16	243	3	7293	16	213	10	6400	16	189	28	5698	16	171	5	5135
17	335	6	10056	17	281	10	8440	17	242	16	7276	17	212	27	6387	17	189	18	5687	17	170	27	5127
18	334	4	10024	18	280	17	8417	18	241	29	7259	18	212	14	6374	18	189	8	5678	18	170	18	5118
19	333	3	9993	19	279	24	8394	19	241	13	7243	19	212	1	6361	19	188	28	5668	19	170	9	5109
20	332	2	9962	20	279	0	8370	20	240	27	7227	20	211	18	6348	20	188	18	5658	20	170	1	5101
21	331	0	9930	21	278	9	8349	21	240	10	7210	21	211	5	6335	21	188	7	5647	21	169	23	5093
22	330	0	9900	22	277	18	8328	22	239	24	7194	22	210	22	6322	22	187	27	5637	22	169	12	5087
23	329	0	9870	23	276	27	8307	23	239	8	7178	23	210	9	6309	23	187	17	5627	23	169	9	5079
24	328	1	9841	24	276	6	8286	24	238	22	7162	24	209	26	6296	24	187	7	5617	24	168	27	5067
25	327	0	9810	25	275	15	8265	25	238	6	7146	25	209	13	6283	25	186	27	5607	25	168	19	5059
26	326	29	9779	26	274	24	8244	26	237	20	7130	26	209	0	6270	26	186	17	5597	26	168	10	5050
27	325	0	9750	27	274	3	8223	27	237	4	7114	27	208	17	6257	27	186	7	5587	27	168	2	5042
28	323	27	9717	28	273	12	8202	28	236	18	7098	28	208	4	6244	28	185	27	5577	28	167	24	5034
29	323	2	9692	29	272	21	8181	29	236	2	7082	29	207	22	6232	29	185	17	5567	29	167	10	5026
30	321	29	9659	30	272	0	8160	30	235	16	7066	30	207	10	6220	30	185	7	5557	30	167	7	5017
31	320	29	9629	31	271	9	8139	31	235	0	7050	31	206	28	6208	31	184	27	5547	31	167	29	5009
32	320	0	9600	32	270	19	8119	32	234	14	7034	32	206	16	6196	32	184	17	5537	32	166	21	5001
33	319	1	9571	33	269	28	8098	33	233	28	7018	33	206	4	6184	33	184	7	5527	33	166	13	4993
34	318	3	9543	34	269	7	8077	34	233	12	7002	34	205	22	6172	34	183	27	5517	34	166	5	4985
35	317	4	9514	35	268	16	8056	35	232	26	6986	35	205	10	6160	35	183	17	5507	35	165	27	4977
36	316	6	9486	36	267	26	8036	36	232	10	6970	36	204	28	6148	36	183	7	5497	36	165	19	4969
37	315	7	9457	37	267	6	8016	37	231	25	6955	37	204	16	6136	37	182	27	5487	37	165	10	4960
38	314	8	9428	38	266	16	7996	38	231	9	6939	38	204	4	6124	38	182	18	5478	38	165	2	4952
39	313	10	9400	39	265	26	7976	39	230	24	6924	39	203	23	6113	39	182	9	5469	39	164	24	4944
40	312	12	9372	40	265	6	7956	40	230	9	6909	40	203	12	6102	40	182	0	5460	40	164	16	4936
41	311	15	9345	41	264	16	7936	41	229	24	6894	41	203	0	6090	41	181	20	5450	41	164	8	4928
42	310	18	9318	42	263	26	7916	42	229	9	6879	42	202	18	6078	42	181	11	5441	42	164	0	4920
43	309	21	9291	43	263	6	7896	43	228	24	6864	43	202	6	6066	43	181	1	5431	43	163	22	4912
44	308	24	9264	44	262	16	7876	44	228	9	6849	44	201	24	6054	44	180	22	5422	44	163	15	4905
45	307	27	9237	45	261	26	7856	45	227	24	6834	45	201	12	6043	45	180	12	5412	45	163	7	4897
46	307	0	9210	46	261	7	7837	46	227	9	6819	46	201	0	6030	46	180	3	5403	46	163	00	4890
47	306	3	9183	47	260	18	7818	47	226	24	6804	47	200	18	6018	47	179	23	5393	47	162	22	4882
48	305	6	9156	48	259	29	7799	48	226	9	6789	48	200	7	6007	48	179	14	5384	48	162	15	4875
49	304	9	9129	49	259	10	7780	49	225	24	6774	49	199	25	5995	49	179	4	5374	49	162	7	4867
50	303	12	9102	50	258	21	7761	50	225	10	6760	50	199	14	5984	50	178	25	5365	50	162	00	4860
51	302	16	9076	51	258	2	7742	51	224	25	6745	51	199	2	5972	51	178	15	5355	51	161	22	4852
52	301	20	9050	52	257	13	7723	52	224	10	6730	52	198	20	5960	52	178	6	5346	52	161	15	4845
53	300	24	9024	53	256	24	7704	53	223	26	6716	53	198	9	5949	53	177	27	5337	53	161	7	4837
54	299	28	8998	54	256	5	7685	54	223	12	6702	54	197	28	5938	54	177	18	5328	54	161	0	4830
55	299	3	8973	55	255	16	7666	55	222	28	6688	55	197	17	5927	55	177	9	5319	55	160	22	4822
56	298	8	8947	56	254	28	7648	56	222	14	6674	56	197	5	5915	56	177	0	5310	56	160	15	4815
57	297	13	8923	57	254	10	7630	57	222	0	6660	57	196	24	5904	57	176	21	5301	57	160	7	4807
58	296	18	8898	58	253	22	7612	58	221	16	6646	58	196	13	5893	58	176	12	5292	58	160	0	4800
59	295	23	8873	59	253	4	7594	59	221	2	6632	59	196	2	5882	59	176	3	5283	59	159	22	4792
60	294	28	8848	60	252	16	7576	60	220	18	6618	60	195	21	5871	60	175	24	5274	60	159	15	4785

352 Chains of 30 Feet, or 10560 Feet, is 2 Miles. 7920 Feet, is 1½ Miles. 6600 Feet, is 1¼ Miles. 5280 Feet, 1 Mile.

(Y.)

11 DEGREES.				12 DEGREES.				13 DEGREES.				14 DEGREES.				15 DEGREES.				16 DEGREES.			
0	159	15	4785	0	145	22	4372	0	134	9	4029	0	124	10	3730	0	115	22	3472	0	108	03	3243
1	159	7	4777	1	145	17	4367	1	134	3	4023	1	124	5	3725	1	115	18	3468	1	107	29	3239
2	159	0	4770	2	145	11	4361	2	133	28	4018	2	124	0	3720	2	115	14	3464	2	107	26	3236
3	158	22	4762	3	145	6	4356	3	133	22	4512	3	123	25	3716	3	115	10	3460	3	107	22	3232
4	158	15	4755	4	145	0	4350	4	133	17	4007	4	123	21	3711	4	115	6	3456	4	107	19	3229
5	158	7	4747	5	144	25	4345	5	133	12	4002	5	123	17	3707	5	115	2	3452	5	107	15	3225
6	158	0	4740	6	144	19	4339	6	133	6	3996	6	123	13	3703	6	114	27	3447	6	107	12	3222
7	157	23	4733	7	144	12	4332	7	133	1	3991	7	123	8	3698	7	114	23	3443	7	107	8	3218
8	157	16	4726	8	144	6	4326	8	132	26	3986	8	123	3	3693	8	114	19	3439	8	107	4	3214
9	157	9	4719	9	144	0	4320	9	132	21	3981	9	122	28	3688	9	114	15	3435	9	107	0	3210
10	157	2	4712	10	143	24	4314	10	132	16	3976	10	122	24	3684	10	114	11	3431	10	106	27	3207
11	156	22	4702	11	143	18	4308	11	132	11	3971	11	122	19	3679	11	114	7	3427	11	106	23	3203
12	156	14	4695	12	143	12	4302	12	132	6	3966	12	122	15	3675	12	114	3	3422	12	106	19	3199
13	156	7	4687	13	143	6	4296	13	132	1	3961	13	122	10	3670	13	113	29	3419	13	106	15	3195
14	156	1	4681	14	143	0	4290	14	131	26	3956	14	122	6	3666	14	113	25	3415	14	106	12	3192
15	155	23	4673	15	142	24	4284	15	131	20	3951	15	122	1	3661	15	113	21	3411	15	106	8	3188
16	155	17	4667	16	142	18	4278	16	131	15	3945	16	121	27	3657	16	113	17	3407	16	106	4	3184
17	155	10	4660	17	142	12	4272	17	131	9	3939	17	121	22	3652	17	113	13	3402	17	106	0	3180
18	155	3	4653	18	142	6	4266	18	131	4	3934	18	121	18	3648	18	113	9	3399	18	105	27	3177
19	154	26	4646	19	142	0	4260	19	130	29	3929	19	121	13	3643	19	113	5	3395	19	105	24	3174
20	154	19	4639	20	141	24	4254	20	130	24	3924	20	121	9	3639	20	113	1	3391	20	105	21	3171
21	154	12	4632	21	141	18	4248	21	130	19	3919	21	121	4	3634	21	112	27	3387	21	105	18	3168
22	154	5	4625	22	141	12	4242	22	130	14	3914	22	121	0	3630	22	112	23	3383	22	105	15	3165
23	153	28	4618	23	141	6	4236	23	130	9	3909	23	120	25	3625	23	112	19	3379	23	105	12	3162
24	153	21	4611	24	141	0	4230	24	130	4	3904	24	120	21	3621	24	112	15	3375	24	105	9	3159
25	153	14	4604	25	140	24	4224	25	129	28	3899	25	120	17	3617	25	112	11	3371	25	105	6	3156
26	153	7	4597	26	140	18	4218	26	129	24	3894	26	120	13	3613	26	112	8	3368	26	105	2	3152
27	152	0	4590	27	140	12	4212	27	129	19	3889	27	120	9	3609	27	112	4	3364	27	104	28	3148
28	152	23	4583	28	140	6	4206	28	129	15	3885	28	120	5	3605	28	112	1	3361	28	104	25	3145
29	152	16	4576	29	140	0	4200	29	129	10	3880	29	119	1	3601	29	111	27	3357	29	104	22	3142
30	152	9	4569	30	139	24	4194	30	129	6	3876	30	119	27	3597	30	111	24	3354	30	104	18	3138
31	152	3	4563	31	139	18	4188	31	129	1	3871	31	119	22	3592	31	111	20	3350	31	104	15	3135
32	151	26	4556	32	139	13	4183	32	128	26	3866	32	119	18	3588	32	111	17	3347	32	104	12	3132
33	151	19	4549	33	139	7	4177	33	128	21	3861	33	119	13	3583	33	111	13	3343	33	104	9	3129
34	151	13	4543	34	139	2	4172	34	128	16	3856	34	119	9	3579	34	111	10	3340	34	104	6	3126
35	151	7	4537	35	138	27	4167	35	128	11	3851	35	119	4	3574	35	111	7	3337	35	104	3	3123
36	150	0	4530	36	138	21	4161	36	128	6	3846	36	119	0	3570	36	111	3	3333	36	104	0	3120
37	150	23	4523	37	138	15	4155	37	128	1	3841	37	118	25	3565	37	110	29	3329	37	103	27	3117
38	150	16	4516	38	138	9	4149	38	127	26	3835	38	118	21	3561	38	110	25	3325	38	103	24	3114
39	150	9	4509	39	138	3	4143	39	127	21	3831	39	118	17	3557	39	110	21	3321	39	103	21	3111
40	149	3	4503	40	137	27	4137	40	127	16	3826	40	118	13	3553	40	110	17	3317	40	103	18	3108
41	149	26	4496	41	137	21	4131	41	127	11	3821	41	118	9	3549	41	110	13	3313	41	103	15	3105
42	149	19	4489	42	137	15	4125	42	127	6	3816	42	118	4	3544	42	110	9	3309	42	103	12	3102
43	149	14	4484	43	137	9	4119	43	127	1	3811	43	118	0	3540	43	110	5	3305	43	103	9	3099
44	149	8	4478	44	137	4	4114	44	126	26	3806	44	117	26	3536	44	109	1	3301	44	103	6	3096
45	149	1	4471	45	136	28	4108	45	126	21	3801	45	117	22	3532	45	109	27	3297	45	103	3	3093
46	148	25	4465	46	136	23	4102	46	126	16	3796	46	117	18	3528	46	109	24	3294	46	103	0	3090
47	148	18	4458	47	136	18	4098	47	126	11	3791	47	117	14	3524	47	109	20	3290	47	102	27	3087
48	148	12	4452	48	136	12	4092	48	126	6	3786	48	117	10	3520	48	109	16	3286	48	102	24	3084
49	148	6	4446	49	136	7	4087	49	126	1	3781	49	117	6	3516	49	109	11	3281	49	102	21	3081
50	147	29	4439	50	136	1	4081	50	125	26	3776	50	117	2	3512	50	109	8	3278	50	102	18	3078
51	147	22	4432	51	135	26	4076	51	125	21	3771	51	116	27	3507	51	109	5	3275	51	102	15	3075
52	147	15	4425	52	135	21	4071	52	125	16	3766	52	116	23	3503	52	109	1	3271	52	102	12	3072
53	147	9	4419	53	135	16	4066	53	125	11	3761	53	116	19	3499	53	108	27	3267	53	102	9	3069
54	147	3	4413	54	135	10	4060	54	125	7	3757	54	116	15	3495	54	108	24	3264	54	102	6	3066
55	146	27	4407	55	135	5	4055	55	125	2	3752	55	116	11	3491	55	108	20	3260	55	102	3	3063
56	146	20	4400	56	135	0	4050	56	124	28	3748	56	116	7	3487	56	108	17	3257	56	102	0	3060
57	146	13	4393	57	134	25	4045	57	124	24	3744	57	116	3	3483	57	108	13	3253	57	101	26	3056
58	146	6	4386	58	134	19	4039	58	124	19	3739	58	115	29	3479	58	108	10	3250	58	101	23	3053
59	145	29	4379	59	134	14	4034	59	124	15	3735	59	115	25	3475	59	108	6	3246	59	101	18	3048
60	145	22	4372	60	134	9	4029	60	124	10	3730	60	115	22	3472	60	108	3	3243	60	101	14	3044

3960 Feet, is $\frac{1}{4}$ of a Mile.

321 Chains of 30 Feet, is a Mile. 321 Chains of 30 Feet, is a Mile.

(Z.)

17 DEGREES.				18 DEGREES.				19 DEGREES.				20 DEGREES.				21 DEGREES.				22 DEGREES.			
0	101	14	3044	0	95	12	2862	0	90	0	2700	0	85	0	2550	0	80	28	2428	0	76	18	2298
1	101	10	3040	1	95	9	2859	1	89	28	2698	1	84	28	2548	1	80	25	2425	1	76	16	2296
2	101	7	3037	2	95	7	2857	2	89	25	2695	2	84	26	2546	2	80	23	2423	2	76	14	2294
3	101	3	3033	3	95	4	2854	3	89	23	2693	3	84	23	2543	3	80	21	2421	3	76	12	2292
4	101	0	3030	4	95	1	2851	4	89	20	2690	4	84	21	2541	4	80	19	2419	4	76	11	2291
5	100	27	3027	5	94	28	2848	5	89	18	2688	5	84	19	2539	5	80	17	2417	5	76	9	2289
6	100	24	3024	6	94	25	2845	6	89	15	2685	6	84	16	2536	6	80	11	2414	6	76	7	2287
7	100	21	3022	7	94	22	2842	7	89	13	2683	7	84	14	2534	7	80	12	2412	7	76	5	2285
8	100	18	3018	8	94	19	2839	8	89	10	2680	8	84	12	2532	8	80	10	2410	8	76	4	2284
9	100	15	3015	9	94	16	2836	9	89	8	2678	9	84	10	2530	9	80	8	2408	9	76	2	2282
10	100	12	3012	10	94	12	2832	10	89	5	2675	10	84	8	2528	10	80	6	2406	10	76	0	2280
11	100	9	3009	11	94	9	2829	11	89	3	2673	11	84	6	2526	11	80	3	2403	11	75	28	2278
12	100	6	3006	12	94	6	2826	12	89	0	2670	12	84	4	2524	12	80	1	2401	12	75	27	2277
13	100	3	3003	13	94	3	2823	13	88	28	2668	13	84	2	2522	13	79	29	2399	13	75	25	2275
14	100	0	3000	14	94	0	2820	14	88	25	2665	14	84	0	2520	14	79	27	2397	14	75	23	2273
15	99	27	2997	15	93	27	2817	15	88	23	2663	15	83	28	2518	15	79	25	2395	15	75	21	2271
16	99	24	2994	16	93	24	2814	16	88	20	2660	16	83	26	2516	16	79	22	2392	16	75	20	2270
17	99	21	2991	17	93	21	2811	17	88	18	2658	17	83	24	2514	17	79	20	2390	17	75	18	2268
18	99	18	2988	18	93	17	2807	18	88	15	2655	18	83	22	2512	18	79	18	2388	18	75	16	2266
19	99	15	2985	19	93	15	2805	19	88	13	2653	19	83	20	2510	19	79	16	2386	19	75	14	2264
20	99	12	2982	20	93	13	2803	20	88	10	2650	20	83	18	2508	20	79	14	2384	20	75	13	2263
21	99	9	2979	21	93	11	2801	21	88	8	2648	21	83	16	2506	21	79	12	2382	21	75	11	2261
22	99	6	2976	22	93	9	2799	22	88	5	2645	22	83	14	2504	22	79	9	2379	22	75	9	2259
23	99	3	2973	23	93	6	2796	23	88	3	2643	23	83	12	2502	23	79	7	2377	23	75	7	2257
24	99	0	2970	24	93	3	2793	24	88	0	2640	24	83	10	2500	24	79	5	2375	24	75	6	2256
25	98	27	2967	25	93	0	2790	25	87	28	2638	25	83	8	2498	25	79	3	2373	25	75	4	2254
26	98	24	2964	26	92	28	2788	26	87	25	2635	26	83	6	2496	26	79	1	2371	26	75	2	2252
27	98	21	2961	27	92	26	2786	27	87	23	2633	27	83	4	2494	27	78	29	2369	27	75	0	2250
28	98	18	2958	28	92	24	2784	28	87	20	2630	28	83	2	2492	28	78	27	2367	28	74	29	2249
29	98	15	2955	29	92	21	2781	29	87	18	2628	29	83	0	2490	29	78	24	2360	29	74	27	2247
30	98	12	2952	30	92	18	2778	30	87	15	2625	30	82	28	2488	30	78	22	2364	30	74	25	2245
31	98	9	2949	31	92	15	2775	31	87	13	2623	31	82	26	2486	31	78	20	2362	31	74	23	2243
32	98	6	2946	32	92	12	2772	32	87	10	2620	32	82	24	2484	32	78	18	2358	32	74	22	2242
33	98	3	2943	33	92	9	2769	33	87	8	2618	33	82	22	2482	33	78	16	2356	33	74	20	2240
34	98	0	2940	34	92	6	2766	34	87	5	2615	34	82	20	2480	34	78	13	2353	34	74	18	2238
35	97	27	2937	35	92	3	2763	35	87	3	2613	35	82	18	2478	35	78	11	2351	35	74	16	2236
36	97	24	2934	36	92	1	2761	36	87	0	2610	36	82	16	2476	36	78	9	2349	36	74	15	2235
37	97	21	2931	37	91	29	2759	37	86	28	2608	37	82	14	2474	37	78	7	2347	37	74	13	2233
38	97	18	2928	38	91	27	2757	38	86	25	2605	38	82	12	2472	38	78	5	2345	38	74	11	2231
39	97	15	2925	39	91	24	2754	39	86	23	2603	39	82	10	2470	39	78	3	2343	39	74	9	2229
40	97	12	2922	40	91	21	2751	40	86	20	2600	40	82	8	2468	40	78	1	2341	40	74	8	2228
41	97	9	2919	41	91	18	2748	41	86	18	2598	41	82	6	2466	41	77	29	2339	41	74	6	2226
42	97	6	2916	42	91	15	2745	42	86	15	2595	42	82	4	2464	42	77	27	2337	42	74	4	2224
43	97	3	2913	43	91	12	2742	43	86	13	2593	43	82	2	2462	43	77	25	2335	43	74	2	2222
44	97	0	2910	44	91	9	2739	44	86	10	2590	44	82	0	2460	44	77	23	2333	44	74	1	2221
45	96	27	2907	45	91	6	2736	45	86	8	2588	45	81	28	2458	45	77	20	2330	45	73	29	2219
46	96	24	2904	46	91	4	2734	46	86	5	2585	46	81	26	2456	46	77	18	2328	46	73	27	2218
47	96	21	2901	47	91	2	2732	47	86	3	2583	47	81	24	2454	47	77	16	2326	47	73	25	2215
48	96	18	2898	48	91	0	2730	48	86	0	2580	48	81	22	2452	48	77	14	2324	48	73	24	2214
49	96	15	2895	49	90	28	2728	49	85	28	2578	49	81	20	2450	49	77	12	2322	49	73	22	2212
50	96	12	2892	50	90	26	2726	50	85	25	2575	50	81	18	2448	50	77	10	2320	50	73	20	2210
51	96	9	2889	51	90	24	2724	51	85	23	2573	51	81	16	2446	51	77	8	2318	51	73	18	2208
52	96	6	2886	52	90	22	2722	52	85	20	2570	52	81	14	2444	52	77	6	2316	52	73	17	2207
53	96	3	2883	53	90	20	2720	53	85	18	2568	53	81	12	2442	53	77	4	2314	53	73	15	2205
54	96	0	2880	54	90	18	2718	54	85	15	2565	54	81	10	2440	54	77	2	2312	54	73	13	2203
55	95	27	2877	55	90	15	2715	55	85	13	2563	55	81	8	2438	55	77	0	2310	55	73	11	2201
56	95	24	2874	56	90	12	2712	56	85	10	2560	56	81	6	2436	56	76	27	2307	56	73	10	2200
57	95	21	2871	57	90	9	2709	57	85	8	2558	57	81	4	2434	57	76	25	2305	57	73	8	2198
58	95	18	2868	58	90	6	2706	58	85	5	2555	58	81	2	2432	58	76	23	2303	58	73	6	2196
59	95	15	2865	59	90	3	2703	59	85	3	2553	59	81	0	2430	59	76	21	2301	59	73	4	2194
60	95	12	2862	60	90	0	2700	60	85	0	2550	60	80	28	2428	60	76	18	2298	60	73	3	2193

(Aa.)

23 DEGREES.				24 DEGREES.				25 DEGREES.				26 DEGREES.				27 DEGREES.				28 DEGREES.			
0	73	3	2193	0	69	20	2090	0	66	17	1997	0	63	17	1907	0	60	24	1824	0	58	5	1745
1	73	1	2191	1	69	18	2088	1	66	15	1995	1	63	15	1905	1	60	23	1823	1	58	3	1743
2	72	29	2189	2	69	17	2087	2	66	14	1994	2	63	14	1904	2	60	22	1822	2	58	2	1742
3	72	27	2187	3	69	15	2085	3	66	12	1992	3	63	12	1902	3	60	20	1820	3	58	1	1741
4	72	25	2185	4	69	13	2083	4	66	11	1991	4	63	11	1901	4	60	19	1819	4	58	0	1740
5	72	23	2183	5	69	11	2081	5	66	9	1989	5	63	9	1899	5	60	18	1818	5	57	28	1738
6	72	21	2181	6	69	10	2080	6	66	8	1988	6	63	8	1898	6	60	16	1816	6	57	27	1737
7	72	19	2179	7	69	8	2078	7	66	6	1986	7	63	6	1896	7	60	15	1815	7	57	26	1736
8	72	17	2177	8	69	7	2077	8	66	5	1985	8	63	5	1895	8	60	14	1814	8	57	25	1735
9	72	15	2175	9	69	5	2075	9	66	3	1983	9	63	3	1893	9	60	13	1812	9	57	24	1734
10	72	13	2173	10	69	4	2074	10	66	2	1982	10	63	2	1892	10	60	11	1811	10	57	22	1732
11	72	11	2171	11	69	2	2072	11	66	0	1980	11	63	0	1890	11	60	10	1810	11	57	21	1731
12	72	9	2169	12	69	1	2071	12	65	29	1979	12	62	29	1889	12	60	8	1808	12	57	20	1730
13	72	7	2167	13	68	29	2069	13	65	27	1977	13	62	27	1887	13	60	7	1807	13	57	19	1729
14	72	5	2165	14	68	28	2068	14	65	26	1976	14	62	26	1886	14	60	6	1806	14	57	18	1728
15	72	3	2163	15	68	26	2066	15	65	24	1974	15	62	24	1884	15	60	4	1804	15	57	17	1727
16	72	1	2161	16	68	25	2065	16	65	23	1973	16	62	23	1883	16	60	3	1803	16	57	16	1726
17	71	29	2159	17	68	23	2063	17	65	21	1971	17	62	21	1881	17	60	2	1802	17	57	15	1725
18	71	27	2157	18	68	22	2062	18	65	20	1970	18	62	20	1880	18	60	0	1800	18	57	14	1724
19	71	24	2155	19	68	20	2060	19	65	18	1968	19	62	18	1878	19	59	29	1799	19	57	12	1722
20	71	23	2153	20	68	19	2059	20	65	17	1967	20	62	17	1877	20	59	28	1798	20	57	11	1721
21	71	21	2151	21	68	17	2057	21	65	15	1965	21	62	15	1875	21	59	25	1796	21	57	10	1720
22	71	19	2149	22	68	15	2055	22	65	14	1964	22	62	14	1874	22	59	23	1795	22	57	9	1719
23	71	17	2147	23	68	13	2053	23	65	12	1962	23	62	13	1873	23	59	21	1794	23	57	8	1718
24	71	15	2145	24	68	12	2052	24	65	10	1960	24	62	10	1872	24	59	20	1793	24	57	7	1717
25	71	14	2144	25	68	10	2050	25	65	9	1959	25	62	9	1870	25	59	18	1792	25	57	6	1716
26	71	12	2142	26	68	9	2049	26	65	7	1957	26	62	7	1869	26	59	17	1791	26	57	5	1715
27	71	10	2140	27	68	7	2047	27	65	6	1956	27	62	6	1867	27	59	16	1790	27	57	4	1714
28	71	8	2138	28	68	6	2046	28	65	5	1955	28	62	5	1866	28	59	15	1789	28	57	3	1713
29	71	6	2136	29	68	4	2044	29	65	3	1953	29	62	4	1864	29	59	14	1788	29	57	2	1712
30	71	4	2134	30	68	3	2043	30	65	2	1952	30	62	3	1863	30	59	13	1787	30	57	1	1711
31	71	2	2132	31	68	1	2041	31	65	0	1950	31	62	2	1862	31	59	12	1786	31	57	0	1710
32	71	0	2130	32	68	0	2040	32	64	29	1949	32	61	29	1861	32	59	11	1785	32	56	29	1709
33	70	28	2128	33	67	29	2039	33	64	27	1947	33	61	28	1859	33	59	10	1784	33	56	28	1708
34	70	26	2126	34	67	28	2038	34	64	26	1946	34	61	27	1858	34	59	9	1783	34	56	27	1707
35	70	24	2124	35	67	26	2036	35	64	24	1944	35	61	25	1857	35	59	8	1782	35	56	26	1706
36	70	22	2122	36	67	25	2035	36	64	23	1943	36	61	24	1856	36	59	7	1781	36	56	25	1705
37	70	20	2120	37	67	23	2033	37	64	21	1941	37	61	23	1855	37	59	6	1780	37	56	24	1704
38	70	18	2118	38	67	21	2031	38	64	20	1940	38	61	22	1854	38	59	5	1779	38	56	23	1703
39	70	17	2117	39	67	19	2029	39	64	18	1938	39	61	21	1853	39	59	4	1778	39	56	22	1702
40	70	16	2116	40	67	17	2027	40	64	17	1937	40	61	20	1852	40	59	3	1777	40	56	21	1701
41	70	15	2115	41	67	15	2025	41	64	15	1935	41	61	18	1851	41	59	2	1776	41	56	20	1700
42	70	14	2114	42	67	14	2024	42	64	14	1934	42	61	17	1850	42	59	1	1775	42	56	19	1699
43	70	12	2112	43	67	12	2022	43	64	13	1933	43	61	16	1849	43	59	0	1774	43	56	18	1698
44	70	11	2111	44	67	11	2021	44	64	11	1931	44	61	15	1848	44	59	29	1773	44	56	17	1697
45	70	9	2109	45	67	9	2019	45	64	9	1929	45	61	14	1847	45	59	28	1772	45	56	16	1696
46	70	7	2107	46	67	8	2018	46	64	7	1927	46	61	13	1846	46	59	27	1771	46	56	15	1695
47	70	6	2106	47	67	6	2016	47	64	6	1926	47	61	12	1845	47	59	26	1770	47	56	14	1694
48	70	4	2104	48	67	5	2015	48	64	4	1924	48	61	11	1844	48	59	25	1769	48	56	13	1693
49	70	3	2103	49	67	3	2013	49	64	3	1923	49	61	10	1843	49	59	24	1768	49	56	12	1692
50	70	2	2102	50	67	2	2012	50	64	2	1922	50	61	9	1842	50	59	23	1767	50	56	11	1691
51	70	0	2100	51	67	0	2010	51	64	0	1920	51	61	8	1841	51	59	22	1766	51	56	10	1690
52	69	29	2099	52	66	29	2009	52	63	28	1918	52	61	7	1840	52	59	21	1765	52	56	9	1689
53	69	28	2098	53	66	28	2008	53	63	27	1917	53	61	6	1839	53	59	20	1764	53	56	8	1688
54	69	26	2096	54	66	26	2006	54	63	25	1915	54	61	5	1838	54	59	19	1763	54	56	7	1687
55	69	25	2095	55	66	25	2005	55	63	24	1914	55	61	4	1837	55	59	18	1762	55	56	6	1686
56	69	24	2094	56	66	24	2004	56	63	23	1913	56	61	3	1836	56	59	17	1761	56	56	5	1685
57	69	23	2093	57	66	23	2003	57	63	22	1912	57	61	2	1835	57	59	16	1760	57	56	4	1684
58	69	22	2092	58	66	22	2002	58	63	21	1911	58	61	1	1834	58	59	15	1759	58	56	3	1683
59	69	21	2091	59	66	21	2001	59	63	20	1910	59	61	0	1833	59	59	14	1758	59	56	2	1682
60	69	20	2090	60	66	20	2000	60	63	19	1909	60	61	0	1832	60	59	13	1757	60	56	1	1681

(Bb.)

29 DEGREES.				30 DEGREES.				31 DEGREES.				32 DEGREES.				33 DEGREES.				34 DEGREES.			
0	55	28	1678	0	53	28	1618	0	51	22	1552	0	49	22	1492	0	47	21	1431	0	45	28	1378
1	55	27	1677	1	53	27	1617	1	51	21	1551	1	49	21	1491	1	47	20	1430	1	45	28	1378
2	55	26	1676	2	53	26	1616	2	51	20	1550	2	49	20	1490	2	47	19	1429	2	45	27	1377
3	55	25	1675	3	53	25	1615	3	51	19	1549	3	49	18	1488	3	47	18	1428	3	45	26	1376
4	55	24	1674	4	53	24	1614	4	51	18	1548	4	49	17	1487	4	47	18	1428	4	45	25	1375
5	55	23	1673	5	53	23	1613	5	51	17	1547	5	49	16	1486	5	47	17	1427	5	45	24	1374
6	55	22	1672	6	53	21	1611	6	51	16	1546	6	49	15	1485	6	47	16	1426	6	45	23	1373
7	55	21	1671	7	53	20	1610	7	51	15	1545	7	49	14	1484	7	47	15	1425	7	45	22	1372
8	55	20	1670	8	53	19	1609	8	51	14	1544	8	49	13	1483	8	47	14	1424	8	45	22	1372
9	55	19	1669	9	53	18	1608	9	51	13	1543	9	49	12	1482	9	47	13	1423	9	45	21	1371
10	55	18	1668	10	53	17	1607	10	51	12	1542	10	49	11	1481	10	47	12	1422	10	45	20	1370
11	55	17	1667	11	53	16	1606	11	51	11	1541	11	49	10	1480	11	47	11	1421	11	45	19	1369
12	55	16	1666	12	53	14	1604	12	51	10	1540	12	49	9	1479	12	47	10	1420	12	45	18	1368
13	55	15	1665	13	53	13	1603	13	51	9	1539	13	49	8	1478	13	47	9	1419	13	45	17	1367
14	55	14	1664	14	53	12	1602	14	51	8	1538	14	49	7	1477	14	47	8	1418	14	45	16	1366
15	55	13	1663	15	53	11	1601	15	51	7	1537	15	49	6	1476	15	47	8	1418	15	45	16	1366
16	55	12	1662	16	53	10	1600	16	51	6	1536	16	49	5	1475	16	47	7	1417	16	45	15	1365
17	55	11	1661	17	53	9	1599	17	51	5	1535	17	49	4	1474	17	47	6	1416	17	45	14	1364
18	55	10	1660	18	53	7	1597	18	51	4	1534	18	49	3	1473	18	47	5	1415	18	45	13	1363
19	55	9	1659	19	53	6	1596	19	51	3	1533	19	49	2	1472	19	47	4	1414	19	45	12	1362
20	55	8	1658	20	53	5	1595	20	51	2	1532	20	49	1	1471	20	47	3	1413	20	45	11	1361
21	55	7	1657	21	53	4	1594	21	51	1	1531	21	49	0	1470	21	47	2	1412	21	45	11	1361
22	55	6	1656	22	53	3	1593	22	51	0	1530	22	48	29	1469	22	47	1	1411	22	45	10	1360
23	55	5	1655	23	53	2	1592	23	50	29	1529	23	48	28	1468	23	47	1	1411	23	45	9	1359
24	55	4	1654	24	53	0	1590	24	50	28	1528	24	48	27	1467	24	47	0	1410	24	45	8	1358
25	55	3	1653	25	52	29	1589	25	50	27	1527	25	48	26	1466	25	46	29	1409	25	45	7	1257
26	55	2	1652	26	52	28	1588	26	50	26	1526	26	48	25	1465	26	46	28	1408	26	45	6	1356
27	55	1	1651	27	52	27	1587	27	50	25	1525	27	48	24	1464	27	46	27	1407	27	45	6	1355
28	55	0	1650	28	52	26	1586	28	50	24	1524	28	48	23	1463	28	46	26	1406	28	45	5	1354
29	54	29	1649	29	52	25	1585	29	50	23	1523	29	48	22	1462	29	46	25	1405	29	45	4	1354
30	54	28	1648	30	52	23	1583	30	50	22	1522	30	48	21	1461	30	46	24	1404	30	45	3	1353
31	54	27	1647	31	52	22	1582	31	50	21	1521	31	48	20	1460	31	46	24	1404	31	45	2	1352
32	54	26	1646	32	52	21	1581	32	50	20	1520	32	48	19	1459	32	46	23	1403	32	45	1	1351
33	54	25	1645	33	52	20	1580	33	50	19	1519	33	48	18	1458	33	46	22	1402	33	45	1	1351
34	54	24	1644	34	52	18	1578	34	50	18	1518	34	48	17	1457	34	46	21	1401	34	45	0	1350
35	54	23	1643	35	52	17	1577	35	50	17	1517	35	48	16	1456	35	46	20	1400	35	44	29	1349
36	54	22	1642	36	52	16	1576	36	50	16	1516	36	48	15	1455	36	46	19	1399	36	44	28	1348
37	54	21	1641	37	52	15	1575	37	50	15	1515	37	48	14	1454	37	46	18	1398	37	44	27	1347
38	54	20	1640	38	52	14	1574	38	50	14	1514	38	48	13	1453	38	46	17	1397	38	44	27	1347
39	54	19	1639	39	52	13	1573	39	50	13	1513	39	48	12	1452	39	46	17	1397	39	44	26	1346
40	54	18	1638	40	52	12	1572	40	50	12	1512	40	48	11	1451	40	46	16	1396	40	44	25	1345
41	54	17	1637	41	52	11	1571	41	50	11	1511	41	48	10	1450	41	46	15	1395	41	44	24	1344
42	54	16	1636	42	52	10	1570	42	50	10	1510	42	48	9	1449	42	46	14	1394	42	44	23	1343
43	54	15	1635	43	52	9	1569	43	50	9	1509	43	48	8	1448	43	46	13	1393	43	44	22	1342
44	54	14	1634	44	52	8	1568	44	50	8	1508	44	48	7	1447	44	46	12	1392	44	44	21	1341
45	54	13	1633	45	52	7	1567	45	50	7	1507	45	48	6	1446	45	46	11	1391	45	44	21	1341
46	54	12	1632	46	52	6	1566	46	50	6	1506	46	48	5	1445	46	46	11	1391	46	44	20	1340
47	54	11	1631	47	52	5	1565	47	50	5	1505	47	48	4	1444	47	46	10	1390	47	44	19	1339
48	54	10	1630	48	52	4	1564	48	50	4	1504	48	48	3	1443	48	46	9	1389	48	44	18	1338
49	54	9	1629	49	52	3	1563	49	50	3	1503	49	48	2	1442	49	46	8	1388	49	44	17	1337
50	54	8	1628	50	52	2	1562	50	50	2	1502	50	48	1	1441	50	46	7	1387	50	44	16	1336
51	54	7	1627	51	52	1	1561	51	50	1	1501	51	48	0	1440	51	46	6	1386	51	44	16	1336
52	54	6	1626	52	52	0	1560	52	50	0	1500	52	47	29	1439	52	46	5	1385	52	44	15	1335
53	54	5	1625	53	51	29	1559	53	49	29	1499	53	47	28	1438	53	46	5	1385	53	44	14	1334
54	54	4	1624	54	51	28	1558	54	49	28	1498	54	47	27	1437	54	46	4	1384	54	44	13	1333
55	54	3	1623	55	51	27	1557	55	49	27	1497	55	47	26	1436	55	46	3	1383	55	44	12	1332
56	54	2	1622	56	51	26	1556	56	49	26	1496	56	47	25	1435	56	46	2	1382	56	44	12	1332
57	54	1	1621	57	51	25	1555	57	49	25	1495	57	47	24	1434	57	46	1	1381	57	44	11	1331
58	54	0	1620	58	51	24	1554	58	49	24	1494	58	47	23	1433	58	46	0	1380	58	44	10	1330
59	53	29	1619	59	51	23	1553	59	49	23	1493	59	47	22	1432	59	45	29	1379	59	44	9	1329
60	53	28	1618	60	51	22	1552	60	49	22	1492	60	47	21	1431	60	45	28	1378	60	44	8	1328

1320 Feet is a $\frac{1}{4}$ of a Mile.

(Cc.)

35 DEGREES.

0	44	8	1328
1	44	7	1327
2	44	6	1326
3	44	5	1325
4	44	5	1325
5	44	4	1324
6	44	3	1323
7	44	2	1322
8	44	1	1321
9	44	1	1321
10	44	0	1320
11	43	29	1319
12	43	28	1318
13	43	27	1317
14	43	26	1316
15	43	26	1316
16	43	25	1315
17	43	24	1314
18	43	23	1313
19	43	22	1312
20	43	22	1312
21	43	21	1311
22	43	20	1310
23	43	19	1309
24	43	19	1309
25	43	18	1308
26	43	17	1307
27	43	16	1306
28	43	15	1305
29	43	15	1305
30	43	14	1304
31	43	13	1303
32	43	12	1302
33	43	11	1301
34	43	11	1301
35	43	10	1300
36	43	9	1299
37	43	8	1298
38	43	8	1298
39	43	7	1297
40	43	6	1296
41	43	5	1295
42	43	5	1295
43	43	4	1294
44	43	3	1293
45	43	2	1292
46	43	1	1291
47	43	1	1291
48	43	0	1290
49	42	29	1289
50	42	28	1288
51	42	28	1288
52	42	27	1287
53	42	26	1286
54	42	25	1285
55	42	25	1285
56	42	24	1284
57	42	23	1283
58	42	22	1282
59	42	22	1282
60	42	21	1281

(Dd)

The Use of the foregoing Tables are to find the distance of a Ship from the Land or a Fort, or any other object, when the Height is not known, which is designed for Military Operations or measuring Land, when the Object is not nearer than a $\frac{1}{4}$ of a Mile, and not more than 2 Miles distance from the centre of the Place the distance is required from, if for Land measuring the Ground round a fixed Spot not exceeding 2 miles each way may be measured.

Each Degree takes up Four Columns, over which is the Degrees. In the First or Left-hand Column, is the Minutes; in the Second Column, is the Chains; in the Third Column, is the odd Feet over Chains; and in the Fourth Column, is the Contents of Feet in the Chains, and odd Feet, which if divided by 3 is the distance in Yards.

If the distance of a Fort or wing of an Army, or Ship at Anchor, or any other object is required from any Place, call it the Centre, and with a Quadrant or Quarter of a Circle, divide from no Degrees on the Left-hand, to 90 on the Right of the Arch, let no Degrees be A. and 90 B. and the Centre or the Radius of the Quadrant C.

At C is a sight Vane which turns to A. and B. or the Centre of the Index at the division that cuts the Degrees and Minutes on the Arch where there is another Vane.

Place the Quadrant on the stand, and if most convenient to form the Base Line to the Left-hand, observe when the Object is on a Line with the Vanes C. and B. then by C. and A. direct a Chain of 30 Feet, at the end of which fix a Halbard or Pole upright at each end of the Chain, then extend the Chain a second Time, and fix another upright in a Line with the two former uprights (see the Plan below) and so on to the distance of 31 Chains, or 930 Feet, or 300 Yards, placing uprights according as they are needful to direct the Chains on a straight Line for the Base, then place the Quadrant at that end of the Base with C. B. pointing to the Pole or upright at the Centre, then move the Index until the sight at C. and that at the end of the Index, are on a Line with the Object the distance is required to give the Angle on the Quadrant, admit the Angle so found to be 5 Degrees 2 Minutes, enter the Table under 5 Degrees, and against 2 Minutes is 352 Chains, or 10560 Feet, which if divided by 3 gives 3520 Yards.

If the Base Line is required to be formed to the Right of the Centre, then must C. and A. be used as C. and B. when the Base Line is to the Left, to point to the Object the distance is required for the Base Line, and when the Quadrant is placed at the extreme end of the Base Line, then the Index must be used from 90 Degrees, and whatever the Angle of the Quadrant is, subtract from 90, the Remainder is the Angle.

N. B. Instruments for the above purpose, and all useful Instruments for the Use of Navigation, are made and repaired by the Author of this Publication.



The Use of the foregoing Tables are to find the distance of a Ship from the Land or a Fort, or any other object, when the Height is not known, which is designed for Military Operations or measuring Land, when the Object is not nearer than $\frac{1}{2}$ of a Mile, and not more than a Mile: distance from the centre of the Place the distance is required from, if for Land measuring the Ground round a fixed Spot, or not exceeding a mile each way may be measured.

Each Degree takes up Four Columns, over which is the Degree. In the First or Left-hand Column, is the Minutes; in the Second Column, is the Chain; in the Third Column, is the odd Feet over Chains; and in the Fourth Column, is the Contents of Feet in the Chain, and odd Feet, which is divided by 3 is the distance in Yards.

If the distance of a Fort or wing of an Army, or Ship at Anchor, or any other object is required from any Place, call it the Centre, and with a Quadrant or Quarter of a Circle, divide from the Centre on the Line, and to go on the Right or the Arch, let the Degrees be A, and go to B, and the Centre or the Position of the Quadrant C.

At C is a right Vane which turns to A, and B, or the Centre of the Index at the divided that cuts the Degrees and Minutes on the Arch where there is another Vane.

Place the Quadrant on the Land, and it will be convenient to turn the Scale Line to the Left-hand, observe when the Object is of a kind with the Vane G, and B, then by C, and A, draw a Chain of 100 Yards, at the end of which fix a Halberd or Pole upright at each end of the Chain, then extend the Chain a second Time, and measure the upright in a Line with the two former uprights (see the Plan below), and so on to the distance of 30 Chains, or 3000 Yards, placing uprights according as they are needed to direct the Chain on a straight Line for the Staff, then place the Quadrant at the end of the Staff with C, B, pointing to the Pole or upright at the Centre, then move the Index until the Degree C, and that at the end of the Index are on a Line with the Object, the distance is required to give the Angle on the Quadrant, adjust the Angle to stand to be 2 Degrees a Minute, enter the Table under 2 Degrees, and against a distance is the Chains or 10000 Feet, which is divided by 3 gives 3333 Yards.

If the Staff line is required to be formed to the Right of the Centre, then turn C, and A, to the right as G, and B, when the Staff line is to the Left, to point to the Object the distance is required for the Staff line, and when the Quadrant is placed at the extreme end of the Staff line, then the Index must be set from 20 Degrees, and whatever the Angle of the Quadrant is, found from the Plan, and is the Angle.

M. E. has made for the above purpose, and all other Instruments for the Use of Navigation, and made and repaired by the Author of this Publication.



